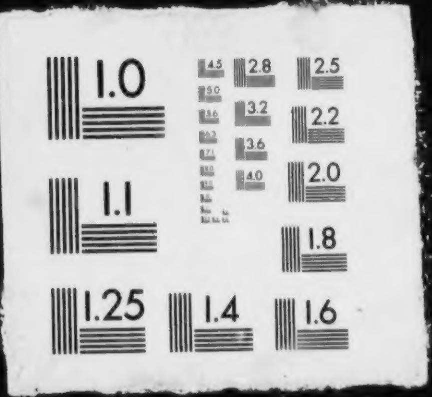
1 OF 2

PB82

204 074


1.0
4.5
2.8
2.5
5.0
5.6
3.2
2.2
6.3
3.6
7.1
8.0
4.0
2.0
1.1
1.8
1.25
1.4
1.6

PB82-204074

# Air Quality Trends in Regions VIII (1980 Data)

(U.S.) Environmental Protection Agency
Denver, CO

Sep 81

**U.S. Department of Commerce**
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Region 8
1860 Lincoln Street
Denver, Colorado 80295

EPA-908/1-81-002
October, 1981

Surveillance and Analysis Division Data Analysis Branch

PB82-204074

# Air Quality Trends in Region VIII

## 1980 Data

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

## TECHNICAL REPORT DATA

*(Please read Instructions on the reverse before completing)*

| | | |
|---|---|---|
| 1. REPORT NO.<br>EPA - 908/1-81-002 | 2. | 3. RECIPIENT'S ACCESSION NO.<br>PB82-204074 |
| 4. TITLE AND SUBTITLE<br>AIR QUALITY TRENDS IN REGION VIII (1980 Data)<br>U.S. Environmental Protection Agency | | 5. REPORT DATE<br>September 1981<br>6. PERFORMING ORGANIZATION CODE |
| 7. AUTHOR(S)<br>William H. Tabor, Thomas A. Entzminger, Stephen C. Bell | | 8. PERFORMING ORGANIZATION REPORT NO. |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>U.S. Environmental Protection Agency<br>Surveillance and Analysis Division<br>1860 Lincoln Street<br>Denver, Colorado 80295 | | 10. PROGRAM ELEMENT NO.<br>11. CONTRACT/GRANT NO. |
| 12. SPONSORING AGENCY NAME AND ADDRESS | | 13. TYPE OF REPORT AND PERIOD COVERED<br>Final<br>14. SPONSORING AGENCY CODE |

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Air quality trends and status for the calendar year 1980 were determined for the six states in Region VIII. These states include Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming. Data resident in the SAROAD national data bank was analyzed.

Statistical test which detect significant differences between two populations were utilized to identify trends. The status and severity of air pollutants was reported as a direct measure of air quality standard and alert level exceedences. The report includes a summary of air quality in each nonattainment area.

17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
|---|---|---|
| Air Pollution Trends<br>Air Quality<br>Nonattainment Areas | Colorado<br>Montana<br>North Dakota<br>South Dakota<br>Utah<br>Wyoming<br>SAROAD | |

| | | |
|---|---|---|
| 18. DISTRIBUTION STATEMENT<br>Release to public | 19. SECURITY CLASS *(This Report)*<br>Unclassified | 21. NO. OF PAGES |
| | 20. SECURITY CLASS *(This page)*<br>Unclassified | 22. PRICE |

EPA - 908/1-81-002

U.S. Environmental Protection Agency

# AIR QUALITY TRENDS

# IN REGION VIII
(1980 DATA)

Data Analysis Branch
Surveillance and Analysis Division
Denver, Colorado
September 1981

# DISCLAIMER

This report has been reviewed by the Surveillance and Analysis Division, U.S. Environmental Protection Agency Region VIII, and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

# ABSTRACT

Air quality trend and status for the calendar year 1980 were determined for the six states in Region VIII. These states include Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming. Data resident in the SAROAD national data bank were analyzed.

Statistical tests which detect significant differences between two populations were utilized to identify trends The status and severity of air pollutants were reported in terms of observed concentrations exceeding air quality standards or alert level limits The report also includes a summary of air quality for each nonattainment area.

# CONTENTS

Page

Abstract.......................................................... ii

Table of Contents................................................. iii

## SECTION I

General Description............................................... 2

Air Quality Standards............................................. 11

Air Quality Nonattainment Areas................................... 11

Analytical Procedures............................................. 16

## SECTION II

State Air Quality Summaries....................................... 19

    Basic Contents of State Summaries............................. 20

    Colorado...................................................... 22

    Montana....................................................... 37

    North Dakota.................................................. 51

    South Dakota.................................................. 57

    Utah.......................................................... 64

    Wyoming....................................................... 76

## LIST OF FIGURES

Figure Page

1. Region VIII Air Quality Status............................ 8

## LIST OF TABLES

Table Page

1. Summary of Air Monitoring in Region VIII................. 7

2. Air Quality Pollutants and Health Effects................ 9

3. EPA Nonattainment Areas in Region VIII - 1978............ 13

4. EPA Nonattainment Areas in Region VIII - 1979............ 14

5. EPA Nonattainment Areas in Region VIII - 1980............ 15

# APPENDICES

Page

A. National Ambient Air Quality Standards...................... 83

B. Break points for Pollution Standards Index (PSI)............ 85

C. Procedures Used to Determine Status......................... 87

D. Nonattainment Area Maps..................................... 94

Denver........................................... 95
Denver/Boulder/Longmont.......................... 96
Pueblo........................................... 97
Larimer/Weld..................................... 98
Colorado Springs................................. 102
Mesa............................................. 103
Missoula Primary TSP............................. 105
Missoula Secondary TSP........................... 106
Missoula CO...................................... 107
Columbia Falls................................... 108
Colstrip......................................... 109
Great Falls...................................... 110
Billings TSP..................................... 111
Laurel........................................... 112
Butte............................................ 113
Anaconda......................................... 114
East Helena $SO_2$................................ 115
East Helena TSP.................................. 116
Davis-Weber...................................... 117
Salt Lake ....................................... 118
Utah TSP......................................... 119
Tooele $SO_2$..................................... 120
Rapid City....................................... 121
Sweetwater County................................ 122

# SECTION I

# GENERAL DESCRIPTION

## Introduction

Air quality monitoring activities have increased substantially in Region VIII over the past few years both in scope and frequency. These increases are due to public demand for accurate information about harmful pollutants in the environment and to the passage of Federal Legislation, namely, The Clean Air Act Amendments. To fulfill the requirements of these legislative mandates State agencies have planned and developed intensive monitoring networks which have generated a mass of air quality data. This report presents a portrayal of current ambient air quality status and trends in the six states comprising EPA's Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming).

## Summary of Analysis and Related Events

During 1980 the air-quality monitoring network was streamlined by decreasing the number of samples collected and eliminating certain monitoring stations. It was noted that considerably fewer counties are taking samples for sulfur dioxide and nitrogen dioxide. Areas exhibiting sulfur dioxide or nitrogen dioxide problems are few and monitoring for these pollutants has decreased considerably. The total number of air-quality sampling sites in Region VIII decreased from 412 in 1979 to 327 in 1980.

Trend analyses performed on the 1978 and 1980 air quality data available in the SAROAD System indicate that only 19 of the 252 counties, where sufficient data were available, experienced statistically significant changes for at least one pollutant group. Air quality was found to be deteriorating in 8 counties and improving in 11 counties. Table 1 summarizes these trends.

## Total Suspended Particulates (TSP)

The severity analyses performed on 1980 air data reveal that total suspended particulates continue to be the most wide-spread pollutant problem in the region. It was found that 17 of the 22 counties which exceeded the primary standard also exceeded the alert levels. TSP was sampled in 100 counties. Twelve counties had deteriorating air quality trends from 1977 to 1979, while only 3 counties showed a deteriorating trend in air quality for the 1978-1980* period. The four counties with improved air quality during 1977-79 continued to show this trend during the 1978-80 period.

The volcanic eruption of Mount St. Helens in Washington caused high TSP readings in Montana and North Dakota. High readings in excess of 1500 $ug/m^3$ occurred from May 19, 1981 to May 23, 1981. For the purposes of this report, TSP values during this time period were ignored . No unusually high pollution readings were noted during this time for the remaining parameters addressed in this report ($SO_2$, $NO_2$, CO, $O_x$ and lead).

## Sulfur and Nitrogen Dioxide ($SO_2$ and $NO_2$)

No appreciable trend was observed for sulfur dioxide or nitrogen dioxide concentrations for the years 1978, 1979, and 1980. The number of counties sampling in 1980 for $SO_2$ and $NO_2$ was less than half those counties sampling in 1979. This reduction is due to the fact that so few violations have been observed in the past.

---

* See Trending Methods For Air Pollutants in Analytical Procedures - Air Quality Section.

## Carbon Monoxide (CO)

During 1980, 14 counties monitored for carbon monoxide. Of the 11 counties where violations of the primary standard occurred, 4 of those counties also experienced alert level violations. There were 13 counties with primary CO violations in 1978 and 1979. The number of counties with alert violations for those years were 3 and 7, respectively. During 1980 5 counties displayed decreasing trends in carbon monoxide concentrations.

## Ozone

Twenty-one counties in the region had ozone sampling programs in 1980. No statistical trends were apparent in the ozone data collected but the ozone concentration in all but one of the counties exceeded the standard. During 1979 only 5 counties reported ozone violations. One reason for this drastic increase in counties reporting violations was a change in the method of determining exceedences. A change in the National Primary and Secondary Ambient Air Quality Standards for ozone is described in the Federal Register, Thursday, February 8, 1979, Part V, 850.9, pages 8220 and 8221. Basically it states that the expected number of exceedences per year averaged over the past three years must be less than or equal to one. If a site has two or more observed exceedences each year the standard is not met and it is not necessary to calculate expected exceedences. If missing value days occur and no other exceedences occur for that year an estimate of the number of exceedences for a year can be made All calculations were based on February 8, 1979 change of primary violation level to 0.12 part per million for maximum hourly average concentrations.

## Lead

Lead, a newly designated criteria pollutant, was sampled in 33 counties during 1980 as compared to 19 counties that collected samples in 1979. Two counties reported violations of the primary standard. Because half of the sites sampling for lead are located in rural rather than in urban settings it is difficult to draw meaningful results from the data in terms of health effects or in terms of trends in concentrations due to vehicular emissions. Composite lead data obtained by the State of Colorado were used in this report and the composite data were not utilized in the trend analysis where no individual daily lead values were present. A lead smelter in one county in Montana caused all 3 of the calendar quarters sampled to be in violation of the primary standard wwhich is based on a 1.5 $ug/m^3$ quarterly average exceedence.

It is expected in the future that with the increased use of unleaded gas in motor vehicles and with retirement of older vehicles, lead pollution will cease to be a problem in the region except in the vicinity of a few industrial sources.

## Other Considerations

The comparisons of single year observations of pollutant concentrations is generally considered inadequate for measuring and describing trends. Nevertheless, at sites which lacked long-term monitoring data or had frequent missing periods of data it was considered better to calculate short-term trends rather than perform no analysis whatsoever. Meteorological considerations such as precipitation, solar intensity, wind speed and direction have a major effect on year-to-year short-term changes in pollutants. These considerations were beyond the scope of this analysis. Current trends referenced in this report are approximated from the 1977, 1978, 1979, and 1980 data bases.

The map in Figure 1 gives a county-by-county picture of Regional air quality status during 1980. Air quality for an entire county was determined by a site within the county that exhibited the most severe pollutant violations. Counties with dotted areas are those which sampled at least one of the criteria pollutants for 75 percent of the total possible sampling time and no violations of health standards were noted. A cross hatched area indicates that at least one of the sampled sites in the county violated primary air quality standards. Solid areas indicate where at least one of the sites in the county exceeded the alert level. Counties without current monitoring data or with less than 75 percent of the total possible sample are left blank.

# TABLE I

## Air Quality Monitoring

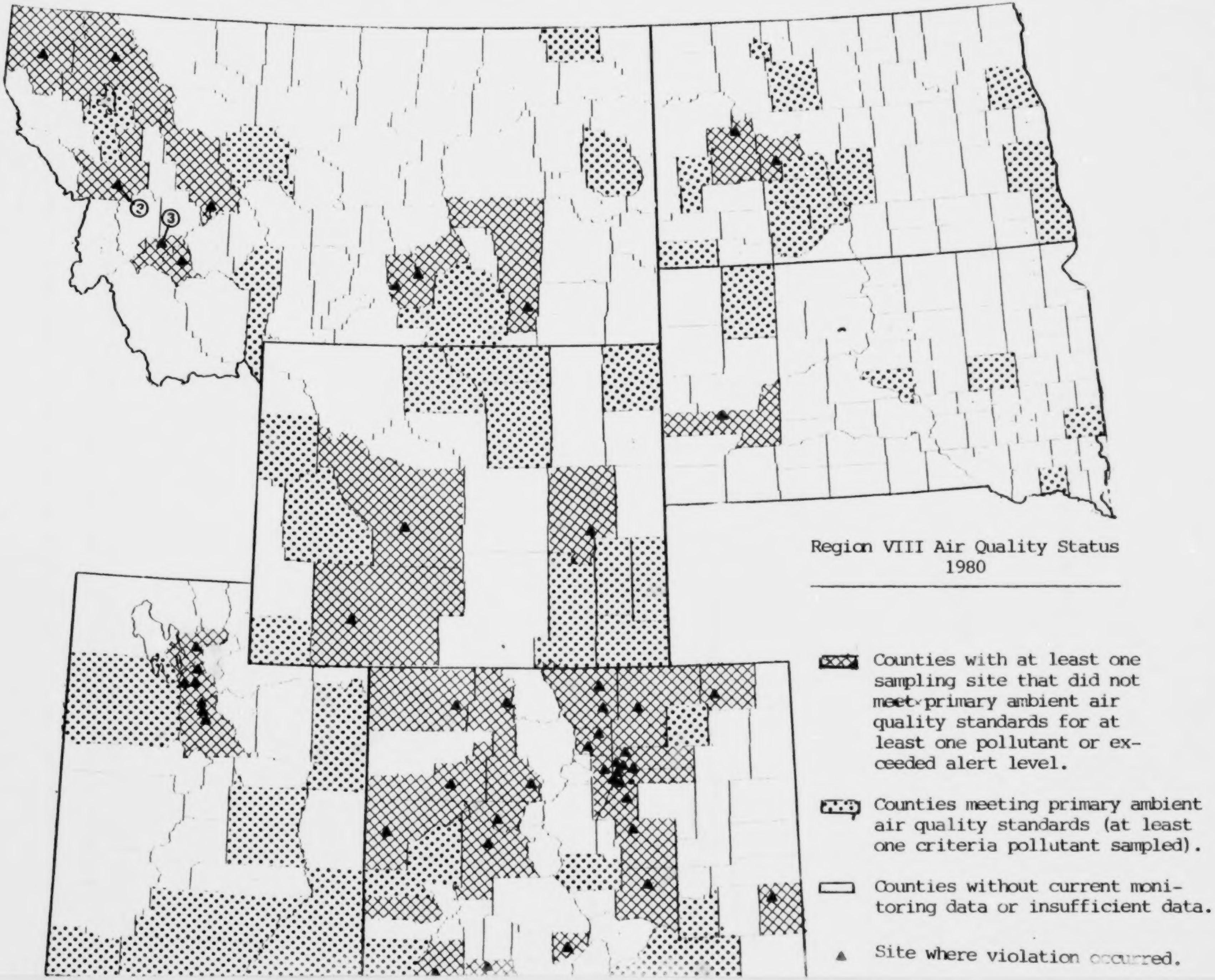
### Summary of Air Monitoring in Region VIII in 1980

| | TSP | $SO_2$ | $NO_2$ | CO | OZONE | LEAD | TOTAL |
|---|---|---|---|---|---|---|---|
| Total sites | 179 | 29 | 16 | 18 | 24 | 61 | 327 |
| Counties with data | 100 | 19 | 16 | 14 | 21 | 33 | 203 |
| Counties exceeding primary standard | 22 | 3 | 0 | 11 | 20 | 2 | 58 |
| Counties exceeding alert level | 17 | 1 | 0 | 4 | 0 | 0 | 22 |
| Counties with deteriorating air quality (1978-1980) | 3 | 0 | 3 | 1 | 1 | 0 | 8 |
| Counties with improving air quality (1978-1980) | 4 | 0 | 2 | 5 | 0 | 0 | 11 |
| Counties with insufficient data or no discernible trend | 93 | 19 | 11 | 8 | 20 | 33 | 184 |

---

[1] U.S. EPA. "Guideline for Public Reporting of Daily Air Quality - Pollutant Standards Index (PSI)," EPA 450/2-76-013, August 1976.

[2] Instrumentation measures ozone which is the primary constituent of oxidants.



Region VIII Air Quality Status
1980

▨ Counties with at least one sampling site that did not meet primary ambient air quality standards for at least one pollutant or exceeded alert level.

░ Counties meeting primary ambient air quality standards (at least one criteria pollutant sampled).

☐ Counties without current monitoring data or insufficient data.

▲ Site where violation occurred.

## TABLE 2

### Air Quality Pollutants and Health Effects

| Pollutant | Physical Description | Health Effect at Concentrations above the Primary Standard |
|---|---|---|
| Total Suspended Particulates (TSP) | TSP is a measurement of particles in the air (such as soot, mist, and sprays) and includes non-toxic materials (dust and dirt) as well as toxic materials (lead, asbestos, sulfates). Natural and man-made sources contribute to TSP which affects the respiratory system in varying degrees depending on particle size and chemical composition. Particle sizes up to 15 micron size can be inhaled into the lungs and particles smaller than 2.5 can become lodged deeply in the lungs. Normally the size of major concern is from .1 to 3 microns. | Aggravation of asthma and chronic lung diseases, increased cough, chest discomfort, restricted activity, aggravation of heart and lung disease symptoms in the elderly, increased death rate; long term exposure to TSP levels from 100-300 Mg/m$^3$ may cause multiple lung function changes. |
| Sulfur Dioxide ($SO_2$) | $SO_2$ is a colorless gas with a arid/pungent odor that is detectable by most people at concentrations greater than .3 to a part per million. When combined with water it forms sulfuric acid. When in the air insufficient quantity it can combine with rain to form "acid rain." This is a problem whose frequency is just being recognized. The most common form of $SO_2$ in the atmosphere, results from combustion of coal and gas or as a by-product in mineral smelting operations. $SO_2$ reacts readily with other atmospheric pollutants to form sulfates, a group of compounds responsible for aggravation of respiratory ailments. | Aggravation of asthma, aggravation of heart and lung disease symptoms in the elderly, increased lung illness, increased death rate; long term exposure to $SO_2$ levels from 05-1ppm may cause multiple lung function changes. |

| | | |
|---|---|---|
| Carbon Monoxide (CO) | CO is a colorless, odorless, tasteless gas--a toxic product of combustion. The automobile engine represents the major single source of this pollutant. | Interference with mental and physical activity, reduced capacity in persons suffering from heart and other circulatory disorders; decreases visual perception and general alertness. |
| Ozone ($O_3$) | Ozone and other photochemical oxidant compounds are formed by a complex series of chemical reactions occurring when hydrocarbons and nitrogen oxides from motor vehicles or other emission sources are exposed to sunlight. Ozone, the critical constituent in oxidants, is a severe irritant to human tissue. | Aggravation of asthma and chronic lung disease, irritation of the eye and of the respiratory tract, decreased vision, reduced heart and lung capacity. |
| Nitrogen Dioxide ($NO_2$) | $NO_2$ is a reddish-brown gas with a pungent odor. It is corrosive and is an oxidizing agent which reacts with hydrocarbon in sunlight to form photochemical oxidants (ozone primarily). $NO_2$ is formed during high temperature combustion (motor vehicle engines and powerplant boilers). | Increased chronic bronchitis, reduced resistance to disease, aggravation of chronic lung disease. |
| Lead (Pb) | Lead is a gray-white metal with a high luster and low melting point. It is produced in a much larger quantity than any other toxic metal. The major use of lead is as a knock retardant (tetraethyl lead) in gasoline. More than half the lead in the country goes into gasoline to produce almost 90% of the total lead in the atmosphere, a large majority of which is in particualte form (usually less than 2 microns). | Impairs hemoglobin production, causes anemia, often fatal to infants. |

# AIR QUALITY STANDARDS

The Environmental Protection Agency was given the authority to establish ambient air quality standards which specify, for the principal and most widespread classes of air pollutants, limitations necessary to protect the public health and welfare. These pollutants currently are total suspended particulate matter, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide and lead.

Two types of standards were established. Primary standards are set at levels to protect human health. Secondary standards are set at levels to protect against other forms of damage to such things as vegetation and materials. The numerical value for each standard is listed in Appendix A.

## Air Quality Nonattainment Areas

The Clean Air Act Amendments of 1977 placed additional requirements on the States and EPA. Section 107(d) directed each State to submit a list of the NAAQS attainment status for all areas within the State. These designations were to be based on air quality levels that existed at the time the Amendments were enacted. States were required by EPA guidance to consider the most recent four quarters of monitored ambient air quality data available. If these data showed no standards violations, then the previous four quarters of monitoring data were to be examined to assure that the current indication of attainment was not the result of a single year's data reflecting unrepresentative meteorological conditions. In the absence of sufficient monitored air quality data, other evaluation methods were used, including air quality disperson modeling. The Act specified that the designated areas could be based on air quality control regions (AQCRs) or any subportions of these areas. EPA advised States they could divide (AQCRs) into various nonattainment, attainment, or unclassified portions, i.e., county, subcounty, or other geographic areas as long as the area could be clearly defined in a written narrative. Additionally, a different geographic area could be used in designating the status for each pollutant. The section 107(d) designations were meant to provide a starting point for States in their effort to correct existing air quality problems and to implement programs under the 1977 CAA Admendments. But the designation of an area as nonattainment or attainment must be considered only a point of departure and not a final, inflexible end in itself. Table 2 indicates, on a state-by-state, pollutant-by-pollutant basis, the attainment status of every area as submitted by the appropriate State agency and approved, or as designated by the Environmental Protection Agency. No distinctions have been made as to the severity of the violations recorded in the areas designated by nonattainment in this table. Each area was designated nonattainment for primary or secondary standard violations. A "P" indicates "does not meet primary standards" and "S" indicates "does not meet secondary standards". The 1980 status and trends for each nonattainment area in Region VIII are described in the appropriate state summary.

## TABLE 3

## EPA NONATTAINMENT AREAS IN REGION VIII

## FEDERAL REGISTER - MARCH 3, 1978

| | | TSP | $SO_2$ | $NO_2$ | CO | $O_3$ |
|---|---|---|---|---|---|---|
| Montana | Colstrip Area | P | | | | |
| | City of Columbia Falls | P | | | | |
| | City of Missoula | P | | | | |
| | Missoula Area | S | | | | |
| | Billings Area | S | | | | |
| | Great Falls Area | S | | | | |
| | Butte Area | S | | | | |
| | East Helena Area | S | PS | | | |
| | Laurel Area | | P | | | |
| | Anaconda Area | | PS | | | |
| | City of Billings | | | | P | |
| | Yellowstone County | | | | | P |
| | Rosebud County | | | | | P |
| So. Dak. | Rapid City Area | P | | | | |
| Utah | Davis County | S | | | | P |
| | Salt Lake County | P | PS | | P | P |
| | Utah County | P | | | | P |
| | Weber County | P | | | | P |
| | City of Price | P | | | | |
| | Cedar City | S | PS | | | |
| | Tooele County | | PS | | | |
| | Uintah County | | | | | P |
| | City of Bountiful | | | | P | |
| | City of Ogden | | | | P | |
| | City of Provo | | | | P | |
| Wyoming | Trona Industrial Area Sweetwater County | P | | | | |
| Colo. | Larimer-Weld Designated Area | P | | | | P |
| | Denver Designated Area | P | | P | P | P |
| | Colo. Springs 3-C | P | | | P | |
| | Pueblo 3-C | P | | | | |
| | Mesa Designated Area | P | | | | |
| | El Paso County | | | | | P |
| | Ft. Collins-Greeley | | | | P | |

P - Does not meet primary standard
S - Does not meet secondary standard

## TABLE 4

## EPA NONATTAINMENT AREAS IN REGION VIII

### CURRENT

| | | TSP | $SO_2$ | $NO_2$ | CO | $O_x$ |
|---|---|---|---|---|---|---|
| CO | Denver Designated Area | PS | | P | P | P |
| | Colo. Springs 3-C | PS | | P | P | P |
| | Pueblo 3-C | PS | | | | P |
| | Mesa Designated Area | P | | | | |
| | Ft. Collins-Greeley | S | | | P | P |
| MT | Colstrip Area | P | | | | |
| | City of Columbia Falls | P | | | | |
| | City of Missoula | P | | | P | |
| | Missoula Area | S | | | | |
| | City of Billings | S | | | P | |
| | Great Falls Area | S | | | P | |
| | Butte Area | P | | | | |
| | East Helena Area | S | PS | | | |
| | Laurel Area | | P | | | |
| | Anaconda Area | | PS | | | |
| SD | Rapid City Area | P | | | | P |
| UT | Davis County Designated Area | S | | | | P |
| | Salt Lake Co. Designated Area | P | PS | | | P |
| | Utah County Designated Area | P | | | | |
| | Weber County Designated Area | P | | | | |
| | Cedar City | | PS | | | |
| | Tooele County Designated Area | | PS | | | |
| | City of Bountiful | | | | P | |
| | City of Ogden | | | | P | |
| | City of Provo | | | | P | |
| | Salt Lake City | | | | P | |
| WY | Trona Industrial Area | P | | | | |

P - Does not meet primary standard
S - Does not meet secondary standard

## TABLE 5

## EPA NONATTAINMENT AREAS IN REGION VIII

### CURRENT

| | | TSP | $SO_2$ | $NO_2$ | CO | $O_x$ |
|---|---|---|---|---|---|---|
| CO | Denver Designated Area | P | | P | P | P |
| | Colo. Springs 3-C | P | | | P | |
| | Pueblo 3-C | P | | | | |
| | Mesa Designated Area | P | | | | |
| | Ft. Collins-Greeley | S | | | P | |
| MT | Colstrip Area | P | | | | |
| | City of Columbia Falls | P | | | | |
| | City of Missoula | P | | | P | |
| | Missoula Area | S | | | | |
| | City of Billings | S | | | P | |
| | Great Falls Area | S | | | P | |
| | Butte Area | P | | | | |
| | East Helena Area | S | PS | | | |
| | Laurel Area | | P | | | |
| | Anaconda Area | | PS | | | |
| SD | Rapid City Area | P | | | | |
| UT | Davis County Designated Area | S | | | | P |
| | Salt Lake Co. Designated Area | P | PS | | | P |
| | Utah County Designated Area | P | | | | |
| | Weber County Designated Area | P | | | | |
| | Cedar City | | PS | | | |
| | Tooele County Designated Area | | PS | | | |
| | City of Bountiful | | | | P | |
| | City of Ogden | | | | P | |
| | City of Provo | | | | P | |
| | Salt Lake City | | | | P | |
| WY | Trona Industrial Area | P | | | | |

P - Does not meet primary standard
S - Does not meet secondary stan

# ANALYTICAL PROCEDURES

## Status and Severity Analysis

Status and severity of air quality are determined by comparing measurements made at monitoring stations to air pollution standards. The indicator used to characterize air quality status in this manner was the number of days in which measurements exceed the primary standards at the worst site in each county. The indicator may not actually represent air quality for the entire county, however the worst site is always selected in an area where measured concentrations are affecting some segment of the population. Complete procedures for determining status are documented in Appendix C.

Another indicator is used to demonstrate the severity of the problem. Each pollutant has been assigned an alert level, the concentration at which the public must be notified of possible adverse health affects. These values shown in Appendix B are significantly higher than the standards and are not frequently encountered.

These two indicators correspond to break points in the Pollutant Standards Index (PSI) which is becoming the nationwide index for reporting air quality levels to the public. In the PSI the worst site pollutant concentration in each metropolitan is chosen, and the index is calculated from the concentration at the site referenced to primary standards and alert levels. PSI breakpoints are detailed by pollutant in Appendix B.

## Trend Methods For Air Pollutants

Modification to Trending Methods used to analyze the data for this report attempted to concentrate on two heretofore elusive statistical considerations: Censoring and Autocorrelation. Censoring is present when one or more observations are at or below the detection limit of the sample. Autocorrelation is present when each observation in the data set is not independent of each of the other observations. Both of these variable characteristics affect the variance of any estimator obtained from the data. Since the trending technique used in this analysis utilizes confidence intervals for true means, which incorporate variances in their construction, it is important to adequately incorporate the censoring and autocorrelation effects.

Autocorrelation studies on air pollutants sampled once every hour show no significant 24-hour autocorrelation. In other words, each 1:00 A.M. reading is independent of each other 1:00 A.M. reading. Likewise, each 2:00 P.M. reading is independent of each other 2:00 P.M. reading, etc. There is, however, very high 1-hour autocorrelation, being on the order of 0.7. This lead to the logical grouping together of all of the 1:00 A.M. data, then all of the 2:00 A.M. data, etc. A further grouping was done on season, due to significant shifts in pollutant populations from season to season. From each grouping of independent hourly observations, a sample average and sample variance were computed. Censoring was handled by computer simulations for the censored values. Each of the 24 sample averages was then used to compute an overall seasonal average. In order to realistically estimate the variance of each seasonal average, the autocorrelation in the 24-hourly averages was incorporated into the formulae. Next, the four seasonal averages were used to compute an overall yearly average. The variance of this overall yearly average was estimated from the variance estimates of the 4 seasonal averages. The averages and estimated variances were then used in constructing confidence intervals for the true yearly means. These intervals were then examined for any overlap in order to detect no significant shifts in the mean values. Non-overlapping intervals indicated significant shifts, the nature of which (i.e. either up or down) was gotten from the relative positions of the confidence intervals.

TSP is not sampled on an hourly basis. Autocorrelation studies on TSP data show very little first order autocorrelation. Also, TSP values are rarely censored. The TSP analysis, therefore, need not incorporate autocorrelation corrections of the variance estimates and the TSP data need not be grouped into sets of independent obervations since the observations are independent at the start. Hence, each season's grouping of data may be considered as a sample with independent obervations from which the seasonal means and variances are estimated.

This year's analysis was done primarily on pollutant years and not on calendar years. A pollutant year is defined from December 1 to November 30. So, pollutant year 1980 is from December 1, 1979 to November 30, 1980. This is done so as to preserve seasonal continuity since seasonal grouping is an important part of this year's trending technique.

# SECTION II

# STATE AIR QUALITY SUMMARIES

# BASIC CONTENTS OF STATE SUMMARIES

The following graphics and charts appear as a part of each state summary:

1. A map showing the location of all active air quality monitoring sites in the state. Stations with more than 75 percent of all possible data are represented by squares. Circles identify stations where less than 75 percent of the data were collected.

2. A table specifying stations and pollutants used for trends and/or status in each county. Stations with less than three years of data were not used for trending but were used for determining current status Each station used for either status or trends was required to have 75 percent of the maximum possible data.

3. A table showing the number of violation days for the years 1977, 1978, 1979 and 1980 for each pollutant at sites within designated nonattainment areas. Both alert level and primary level violation days were noted along with a count of sampling days.

4. A bar chart showing total days sampled and alert and primary

violation days in 1980 by county and specific site. Each site with a violation or criteria pollutants is displayed.

5. A chart showing current status and trends by county and pollutant. If there were no data or insufficient data in the county, arrows were not shown. Status was determined by comparing the 1977, 1978, and 1980* data. Ozone status was based on a three year average of 1-hour primary level violation.

---

* See Trending Methods For Air Pollutants in Analytic Procedures - Air Quality Section.

# COLORADO AIR QUALITY

The Denver metropolitan area, Colorado Springs area Pueblo and the Fort Collins/Greeley areas still are the major air pollution problem areas in Colorado. High TSP violation rates were recorded at Denver's 21st and Broadway site. TSP violations were also noted at sites in 13 other counties. Nearly 30 percent of all instances in which the TSP health primary standard was exceeded involved concentrations at or above the alert level, not only in heavily populated Denver County, but also throughout most of the State. Carbon monoxide violations tend to be confined to the metropolitan areas of Denver, Colorado Springs, Fort Collins and Greeley. Denver has by far the most numerous CO violations although the quality trend is improving. Seven percent of the total CO exceedences of the primary health standard involved concentrations above the alert level. This is down from 21 percent in 1979. The Denver metro area had all except one of the 10 alert level violations (10) in the State. One expected and one actual ozone standard exceedence were recorded in the Denver metro area, the Fort Collins/Greeley area and the Colorado Springs area.

## Status of Nonattainment Areas in Colorado

Larimer-Weld Designated Areas - The State of Colorado Air Pollution Control, Division with the approval of EPA, changed the primary nonattainment status for TSP. The designation for TSP was changed to a secondary standard for Fort Collins and Greeley. On November 26, 1979, the Larimer-Weld designated area was changed to unclassified for ozone. The only station sampling ozone during

1978, 1979 was at Greeley. This station showed one violation each year in 1978, 1979 and 1980. Fort Collins started an ozone monitoring station in 1980. No violations occurred at that station.

El Paso County - This area was changed to unclassified for ozone on November 25, 1979. No violations were observed at the Colorado Springs station for 1976 to 1979. However, seven expected exceedences were calculated for 1980 because of missing data.

Denver Designated Area - Total suspended particulates were sampled in an area shown by the map in Appendix D. Causes of violations are the power plants, fireplaces, auto and truck exhaust, street cleaning, winter sanding, unpaved roads, construction work, demolition activities, unpaved alleys and parking areas.

The number of sampling stations remained approximately the same, i.e., 25 in 1977, 22 in 1978, 23 in 1979, and 20 in 1980, but the sampling days increased from 91 in 1977 to 144 in 1978, 177 in 1979 and 162 in 1980. No significant trend in pollution was noted. However, overall primary and alert level violations decreased slightly from 1979 to 1980. Increased downtown construction appears to be one of the causes of the 1979-1980 increase in TSP violation levels.

The nitrogen dioxide nonattainment area generally represented by the Denver metro area is shown on the map in Appendix D. The carbon monoxide and ozone nonattainment areas consist of Adams, Arapahoe, Boulder, Denver, Douglas and Jefferson Counties. Automobile emissions as affected by meteorological phenomenon common to the Rocky Mountains are the main cause of $NO_2$, CO and $O_x$ pollutant problems. There were 3 stations monitoring $NO_2$ during 1980, 2 in 1979, 3 in 1978, and 5 in 1977. No violations were noted in 1978, 1979 or 1980.

Eight stations were used to monitor CO with an improvement trend in violation rates for the four year period. Of the 359 days sampled in 1980, 82 days showed primary or alert level violations - down considerably from the 160 days in 1979. Seven ozone stations operating in 1978, 1979, and 1980 (5 in 1977) showed no specific trend during this period. There were 3 primary violations in 1980 compared with 12 in 1979.

Colorado Springs 3C Area - The area of El Paso County in and around Colorado Springs comprises this area. CO problems are primarily caused by automobiles and the meteorology and topography of the area. The last four years have shown a general primary violation day increase from 0 and 4 in 1977 and 1978 respectively to 11 and 7 violations in 1979 and 1980 respectively.

Along with the semi-arid climate which promotes the potential for air borne dust, winter sanding, grading and construction activities contribute to TSP problems. The one station which sampled this area for an average of 81 days per year showed no primary violations during 1977, 1978, 1979 or 1980.

Pueblo 3C Area - The map in Appendix D shows the area of nonattainment for TSP which consists of the City of Pueblo and its immediate outskirts. The CF&I

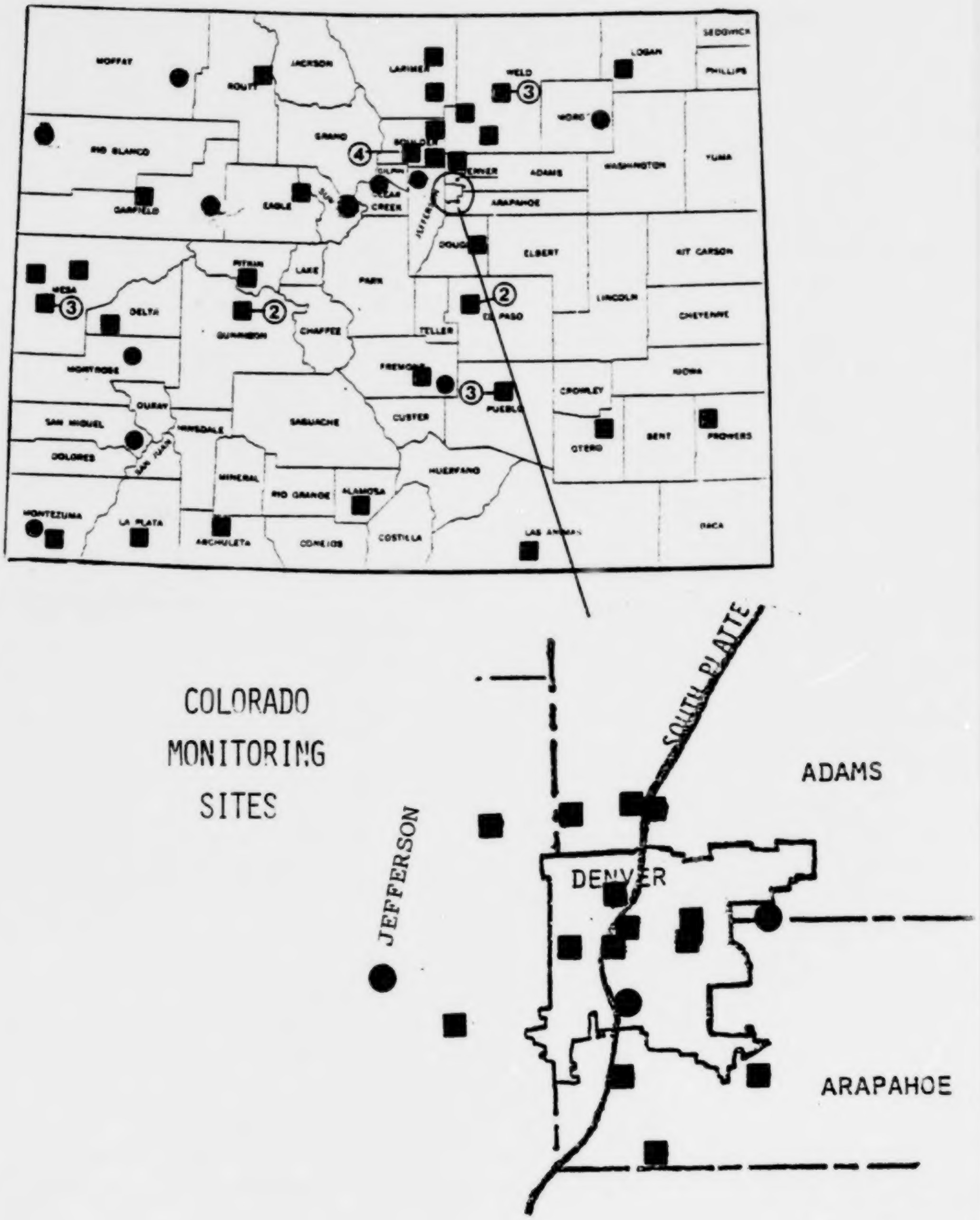
Steel Company is one of the major contributors to TSP along with nontraditional sources. Four stations were sampled for TSP an average of 86 days from 1977 to 1980. During 1977 six primary violation days were observed. There were only 5 total primary violations in the 1978 to 1980 period.

Mesa Designated Area - This area is in and around Grand Junction. Three stations were sampled in 1977 and 1978 with four stations used in 1979 and 1980. No violations for TSP were noted in any of the four years which were sampled an average of 84 days per year.

Fort Collins - Greeley Area - The City limits of Fort Collins and Greeley constitute the limits of this area. This area showed only 1 primary level violation of TSP but 23 secondary level violations in 1980. Motor vehicles cause the vast majority of CO emissions in these two cities with the meteorology and topography of the area being of some consideration in pollution dispersion. The two stations (one in Greeley and one in Fort Collins) were sampled daily and showed a marked decrease in carbon monoxide alert and primary standard violations from 1979 to 1980. Nine alert level violations were observed in 1979 versus 0 in 1980.

The TSP sampling done at these stations showed no apparent increase in primary violation levels between 1977, 1978, 1979 and 1980 (1,2,2,1). The average number of sampling days was 85 per year. This area was changed to a secondary level nonattainment area in 1979. The year 1980 showed only one primary violation but 23 secondary level violations.

Other Problem Areas - No Nonattainment Status - The worst continuing TSP problem area which is currently not a TSP nonattainment area is Steamboat Springs (Routt County). Fugitive dust problems are the main causes of violations here. During 1980 there were 4 alerts and 11 primary level violations.


MOFFAT
ROUTT
JACKSON
LARIMER
WELD
LOGAN
SEDGWICK
PHILLIPS
MORGAN
RIO BLANCO
GRAND
BOULDER
GILPIN
CLEAR CREEK
DENVER
ADAMS
WASHINGTON
YUMA
GARFIELD
EAGLE
SUMMIT
JEFFERSON
ARAPAHOE
DOUGLAS
ELBERT
KIT CARSON
MESA
PITKIN
LAKE
PARK
DELTA
GUNNISON
CHAFFEE
TELLER
EL PASO
LINCOLN
CHEYENNE
MONTROSE
FREMONT
PUEBLO
CROWLEY
KIOWA
OURAY
SAN MIGUEL
HINSDALE
SAGUACHE
CUSTER
OTERO
BENT
PROWERS
DOLORES
SAN JUAN
MINERAL
HUERFANO
RIO GRANDE
ALAMOSA
MONTEZUMA
LA PLATA
ARCHULETA
CONEJOS
COSTILLA
LAS ANIMAS
BACA
3
4
3
2
2
3
SOUTH PLATTE
ADAMS
JEFFERSON
DENVER
ARAPAHOE

COLORADO
MONITORING
SITES

■ Stations with greater than 75% of maximum possible data

● Stations with less than 75% of maximum possible data

# COLORADO

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station No. | TSP | $SO_2$ | $NO_2$ | CO | $O_x$ | LEAD |
|---|---|---|---|---|---|---|---|---|
| Adams | Adams | 060020001F01 | X | | | | | X* |
| | Aurora | 060140001F01 | X | | | | | |
| | Brighton | 060240001F01 | X | | | | | X* |
| | Welby | 062210001F01 | | X | X | X | X | |
| | Westminster | 062240002F01 | X | | | | | |
| Alamosa | Alamosa | 060040001F01 | X | | | | | X* |
| Arapahoe | Cherry Cr. Dam | 060080001F01 | X | | | | | X* |
| | Englewood | 060780001F01 | X | | | | | X* |
| | S. Univ. Blvd. | 060080002F01 | X* | | | X | X | X* |
| | Aurora | 060440002F01 | X* | | | | X* | |
| Archuletta | Pagosa Spgs | 060100001F01 | X | | | | | |
| Boulder | Boulder | 060200001F01 | X | | | | | X* |
| | Boulder | 060200008G05 | | | | X* | | |
| | Boulder | 060200006G05 | | | | | X* | |
| | Longmont | 061460001F01 | X | | | | | X* |
| Clear Cr. | Idaho Springs | 060360001F01 | X* | | | | | |
| Delta | Delta | 060540001F01 | X | | | | | X* |
| Denver | Denver/Annex | 060580001F01 | X | | | | | X* |
| | Denver 21st/Bdwy. | 060580002F01 | X | X | X | X | X | X* |
| | Denver Health Dept. | 060580007F01 | X | | | | | X* |
| | Denver/Colo. Blvd. | 060580010F01 | | | | X | | |
| | Denver/Marion | 060580012F01 | X | | | | | X* |
| | Denver/Julian | 060580009F01 | X | | | X | X | X* |
| | Denver/1050S. Bdwy. | 060580003F02 | | | | | | X* |
| Douglas | Castle Rock | 060660001F01 | X | | | | | |
| Eagle | Vail | 060700002F01 | X | | | | | |
| El Paso | Colorado Springs | 060380004F01 | X | | X* | X | X | X* |
| | Coloradp Springs | 060380006F01 | | | | X | | |
| Fremont | Canon City | 060300001F01 | X | | | | | |
| Garfield | Glenwood Springs | 060920001F01 | X* | | | | | |
| | Rifle | 060880001F01 | X | | | | | X* |
| Gunnison | Crested Butte | 061020001F01 | X* | | | | | |
| | Crested Butte | 061040002F01 | X | | | | | |

*Status Only

## COLORADO

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station Number | TSP | $SO_2$ | $NO_2$ | CO | $O_x$ | LEAD |
|---|---|---|---|---|---|---|---|---|
| Jefferson | Arvada | 060120002F01 |  |  |  | X | X |  |
|  | Arvada | 060120003F01 | X |  |  |  |  | X* |
|  | Golden | 060940001F01 | X* |  |  |  |  |  |
|  | Lakewood | 061260001F01 | X |  |  |  |  |  |
|  | Rocky Flats | 061140001F02 | X* |  |  |  |  | X* |
| La Plata | Durango | 060680003F01 | X |  |  |  |  | X* |
| Larimer | Ft Collins | 060820001F01 | X |  |  | X* | X* | X* |
|  | Loveland | 061480002F01 | X |  |  |  |  |  |
| Las Animas | Trinidad | 062160002F01 | X |  |  |  |  | X* |
| Logan | Sterling | 062080001F01 | X* |  |  |  |  |  |
| Mesa | Fruita | 061520001F01 | X |  |  |  |  | X |
|  | Grand Jct | 060980010F01 | X |  |  |  |  | X* |
|  | Palisade | 061520002F01 | X |  |  |  |  | X* |
|  | Grand Jct | 060980011F01 | X* |  |  |  |  | X* |
|  | Grand Jct | 060980012F01 |  |  |  | X* |  |  |
| Moffat | Craig | 060480001F01 | X* |  |  |  |  |  |
| Montezuma | Mesa Verde | 061530003F03 | X |  |  |  |  | X* |
|  | Cortez | 060440002F01 |  |  |  |  |  | X* |
| Montrose | Montrose | 061620001F01 | X* |  |  |  |  | X* |
| Morgan | Brush | 060280001F01 | X* |  |  |  |  |  |
| Otero | La Junta | 061220001F01 | X |  |  |  |  |  |
| Pitkin | Aspen | 061780001F01 | X |  |  |  |  |  |
| Prowers | Lamar | 061280001F01 | X |  |  |  |  |  |
| Pueblo | Pueblo | 061820001F01 |  |  |  |  |  | X* |
|  | Pueblo Fire Sta. | 061820003F01 | X |  |  |  |  | X* |
|  | Pueblo Health Department | 061820007F01 |  | X |  |  |  |  |
| Routt | Steamboat Spgs | 061920003F01 | X |  |  |  |  | X* |
| San Miguel | Telluride | 062000001F01 | X* |  |  |  |  | X* |
| Weld | Greeley | 061000003F01 | X* |  |  |  |  | X* |
|  | Greeley | 061000005F01 |  |  |  | X | X* |  |
|  | Greeley | 061000006F01 | X |  |  |  |  |  |
|  | Johnstown | 062720005F01 | X* |  |  |  |  |  |
|  | Platteville | 062720005F01 | X |  |  |  |  |  |

*Status Only

# COLORADO

## STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN 75% OF MAXIMUM DAYS

| County | City or Location | Station No. | TSP | $O_x$ |
|---|---|---|---|---|
| Boulder | Broomfield | 060260001F01 | X | |
| | Boulder | 060200008G05 | | X |
| Denver | Denver-Gates Rubber | 060580003F01 | X | |
| | Denver-1010 S Bdwy | 060580003F02 | X | |
| | E Colfax & Colo Blvd | 060580010F01 | X | |
| Fremont | Florence | 060800001F01 | X | |
| Rio Blanco | Rangely | 061860002F01 | X | |

## AIR QUALITY TRENDS
## BASED ON STANDARD VIOLATIONS

## COLORADO

## NONATTAINMENT AREAS

| | | Total Suspended Particulates | | | | Nitrogen Dioxide | | | | Carbon Monoxide | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nonattainment Area | Year | Days Sampled | Geom. Mean a (µg/m$^3$) | Viol. Days | Stas. | Avg. Percent Ob./Sta. | Arith. Mean a (µg/m$^3$) | Stas. W/Yrly. Avg. Viols. | Stas. | Days Sampled | Arith. Mean a (Mg/m$^3$) | Viol. Days | Stas. |
| Denver Designated Area | 1977 | 91 | 85 | A-4/P-17 | 25 | 86% | 66 | P-2 | 5 | 365 | 2.7 | A-18/P-145 | 9 |
| | 1978 | 144 | 88 | A-8/P-26 | 22 | 72% | 75 | P-0 | 3 | 365 | 2.7 | A-34/P-184 | 9 |
| | 1979 | 177 | 93 | A-27/P-52 | 23 | 91% | 76 | P-0 | 2 | 365 | 2.7 | A-34/P-160 | 9 |
| | 1980 | 162 | 95 | A-23/P-54 | 20 | 90% | 68 | P-0 | 3 | 359 | 2.3 | A-8/P-82 | 8 |
| Colorado Springs 3C | 1977 | 80 | 78 | P-0 | 1 | | | | | 350 | 2.0 | P-0 | 2 |
| | 1978 | 71 | 87 | P-0 | 1 | | | | | 365 | 2.2 | A-1/P-4 | 2 |
| | 1979 | 82 | 87 | P-0 | 1 | | | | | 365 | 2.3 | A-1/P-11 | 2 |
| | 1980 | 91 | 86 | P-0 | 1 | | | | | 365 | 2.1 | P-7 | 2 |
| Pueblo 3C | 1977 | 90 | 99 | A-1/P-6 | 2 | | | | | | | | |
| | 1978 | 79 | 97 | P-1 | 2 | | | | | | | | |
| | 1979 | 96 | 95 | A-1/P-2 | 2 | | | | | | | | |
| | 1980 | 79 | 88 | P-2 | 4 | | | | | | | | |

---

[a] Average of the geometric or arithmetic means for all stations

A = Alert Violation Days

P = Primary Standard Violation Days

S = Secondary Standard Violation Days Where Nonattainment Area

## AIR QUALITY TRENDS (Contd)
## BASED ON STANDARD VIOLATIONS

## COLORADO

## NONATTAINMENT AREAS

| | | Total Suspended Particulates | | | | Nitrogen Dioxide | | | | Carbon Monoxide | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nonattainment Area | Year | Days Sampled | Geom. Mean a $(\mu g/m^3)$ | Viol. Days | Stas. | Avg. Percent Ob./Sta. | Arith. Mean a $(\mu g/m^3)$ | Stas. W/Yrly. Avg. Viols. | Stas. | Days Sampled | Arith. Mean a $(Mg/m^3)$ | Viol. Days | Stas. |
| Mesa Designated Area | 1977 | 91 | 62 | P-0 | 3 | | | | | | | | |
| | 1978 | 77 | 61 | P-0 | 3 | | | | | | | | |
| | 1979 | 86 | 69 | P-0 | 4 | | | | | | | | |
| | 1980 | 80 | 67 | P-0 | 4 | | | | | | | | |
| Fort Collins Greeley | 1977 | 81 | 62 | P-1 | 3 | | | | | 365 | 1.4 | P-6 | 1 |
| | 1978 | 81 | 68 | P-2 | 3 | | | | | 361 | 1.4 | P-4 | 1 |
| | 1979 | 87 | 68 | A-1/P-2 | 3 | | | | | 362 | 2.5 | A-9/P-20 | 1 |
| | 1980 | 90 | 73 | P-1 | 3 | | | | | 332 | 1.6 | P-12 | 2 |

---

a Average of the geometric or arithmetic means for all stations
A = Alert Violation Days
P = Primary Standard Violation Days
S = Secondary Standard Violation Days Where Nonattainment Area

# AIR QUALITY TRENDS
# BASED ON STANDARD VIOLATIONS

## COLORADO

## NONATTAINMENT AREAS

| Nonattainment Area | Year | Days Sampled | Ozone | | |
|---|---|---|---|---|---|
| | | | Average Arithmetic Mean of Stations (Parts/Million) | Actual Violation Days | No. of Stations |
| Denver Designated Area | 1977 | 363 | .020 | P-15 | 5 |
| | 1978 | 356 | .022 | A-1/P-5 | 7 |
| | 1979 | 365 | .025 | P-12 | 7 |
| | 1980 | 365 | .024 | P-3 | 7 |

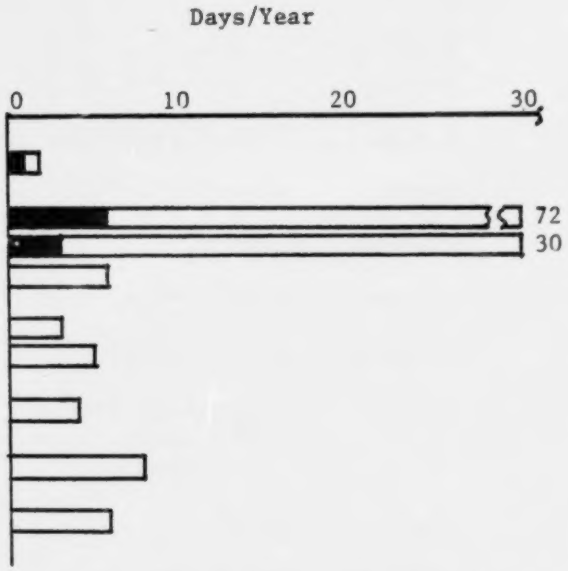
A - Alert Violation Days
P - Primary Standard Violation Days

## NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS EXCEEDED IN 1980

## COLORADO

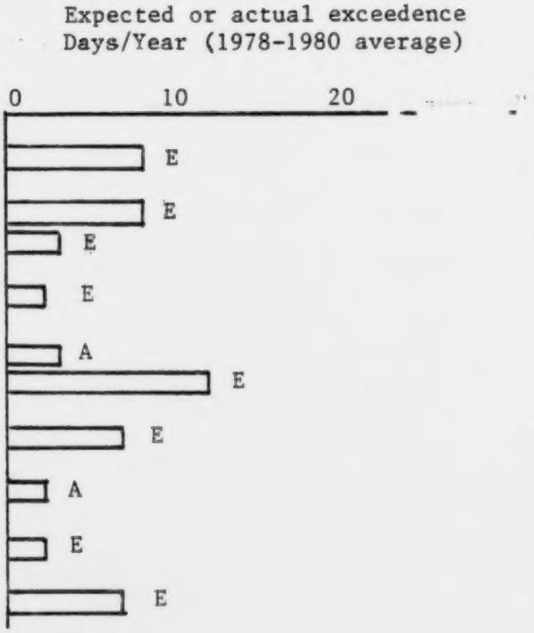
### CARBON MONOXIDE

| County | (City or Location) | Days Sampled (% of Maximum) |
|---|---|---|
| Boulder | (Boulder) | 76 |
| Denver | (Colo. Blvd.) | 84 |
| | (2105 Broadway) | 90 |
| | (Julian) | 87 |
| El Paso | (Colo. Spgs.) | 95 |
| | (Colo. Spgs. Uinta) | 99 |
| Jefferson | (Arvada) | 90 |
| Larimer | (Ft. Collins) | 79 |
| Weld | (Greeley) | 83 |



### OZONE

| County | (City or Location) | Days Sampled (% of Maximum) |
|---|---|---|
| Adams | (Welby) | 89 |
| Arapahoe | (So. Univ.) | 71 |
| | (Aurora) | 6 |
| Boulder | (Boulder) | 78 |
| Denver | (Julian) | 88 |
| | (Broadway) | 91 |
| El Paso | (Colo. Spgs.) | 91 |
| Jefferson | (Arvada) | 91 |
| Larimer | (Ft. Collins) | 9 |
| Weld | (Greeley) | 78 |



☐ Primary level exceeded

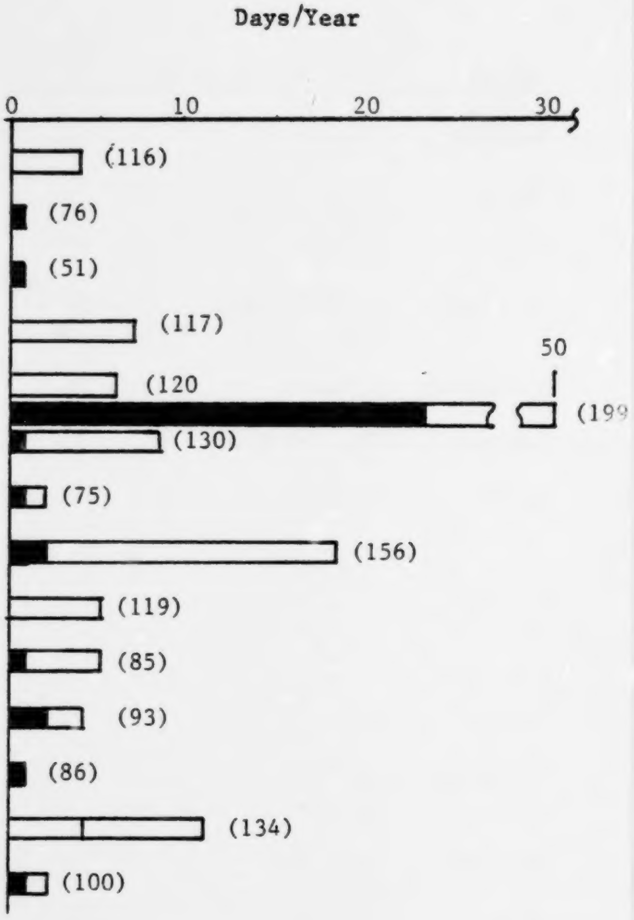
■ Alert level exceeded

NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS EXCEEDED IN 1980

COLORADO

TOTAL SUSPENDED PARTICULATES

| County | (City or Location) | Days Sampled |
|---|---|---|
| Adams | (Adams City) | 84 |
| Alamosa | (Alamosa) | 87 |
| Arapahoe | (8100 S. Univ. Bldv.) | 83 |
| Archuleta | (Pagosa Spgs.) | 84 |
| Denver | (City County Bldg.) | 85 |
|  | (2105 Broadway) | 177 |
|  | (51st & Marion) | 87 |
| Eagle | (Vail) | 92 |
| Garfield | (Rifle) | 88 |
| Gunnison | (Crested Butte) | 75 |
| La Plata | (Durango) | 80 |
| Larimer | (Loveland) | 79 |
| Moffat | (Craig) | 71 |
| Routt | (Steamboat Spgs.) | 68 |
| San Miguel | (Telluride) | 74 |



☐ Primary level exceeded

■ Alert level exceeded

( ) Annual Geometric Mean $\mu g/m^3$

## STATUS AND TRENDS IN AIR QUALITY

## COLORADO

| County | TSP | SO2 | NO2 | CO | Ox | LEAD | County | TSP | SO2 | NO2 | CO | Ox | LEAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adams | ▣⇨ | ⇨ | ⇩ | ☐ | ▣⇨ | ☐ | Larimer | ➡ | | | | ▣ | ☐ |
| Alamosa | ➡ | | | | | | Las Animas | ⇨ | | | | | ☐ |
| Arapahoe | ➡ | | | ⇧ | ☐ | ☐ | Logan | ☐ | | | | | |
| Archuleta | ⇨ | | | | | | Mesa | ▣⇨[a] | | | | | ☐ |
| Boulder | ➡ | | | ■ | | ☐ | Moffat | ■ | | | | | |
| Delta | ⇨ | | | | | ☐ | Montezuma | ⇧ | | | | | ☐ |
| Denver | ➡ | ⇨ | ⇩ | ⬆ | ▣⇨ | ▣ | Montrose | ☐ | | | | | |
| Douglas | ▣⇨ | | | | | | Morgan | ☐ | | | | | |
| Eagle | ➡ | | | | | | Otero | ⇧ | | | | | |
| El Paso | ▣⇨ | | ☐ | ▣⇨ | ▣⇩ | ☐ | Pitkin | ▣⇨[a] | | | | | |
| Fremont | ⇨ | | | | | | Prowers | ▣⇨[a] | | | | | |
| Garfield | ⬇ | | | | | ☐ | Pueblo | ▣⇨ | | | | | ☐ |
| Gunnison | ▣⇩ | | | | | | Routt | ➡ | | | | | ☐ |
| Jefferson | ▣⇨ | | | ▣⇧ | ▣⇨ | ☐ | San Miguel | ■ | | | | | ☐ |
| La Plata | ➡ | | | | | ☐ | Weld | ▣⇨ | | | ⇩ | ☐ | ☐ |

| | |
|---|---|
| ☐ | No evidence standard exceeded |
| ▣ | Exceeds primary standard |
| ■ | Exceeds alert level |
| ⇧ | Improvement |
| ⇨ | No apparent trend |
| ⇩ | Deterioration |

a/ Status Based on Annual Mean Only

# MONTANA AIR QUALITY

Improving and degrading air quality trends were detected at some of the monitoring sites in the state. Improvements in air quality were noted at the City of Missoula and the Anaconda area. Decreases in carbon monoxide violations were evident in the Missoula area even though the city is situated in a valley where air stagnation and pollution entrapment have been a problem. The number of sulfur dioxide violations in the Anaconda area continues to decline. The Anaconda smelter was shut down in September 1980.

## Status of Nonattainment Areas in Montana

Rosebud County - This area was changed from nonattainment to unclassified for ozone. No ozone sampling was done in Montana during 1976, 1978 or 1979. At the City of Rosebud there were no ozone violations during the 290 sampling days in 1977.

Colstrip Area - The Rosebud County area is a square approximately 11 miles on a side centered at Colstrip. Montana. This area had been designated nonattainment for TSP for both 24 hour and annual primary standards. Five sampling sites in the area had no primary violations and only two secondary violations during the 32 days of sampling in 1979. At the Ashland site, the only site sampled in prior years, no violations were detected for the years 1976, 1977 and 1978.

City of Columbia Falls - The city limits of Columbia Falls describes the TSP nonattainment area located in Flathead County. This area was designated nonattainment for the primary standard. Fugitive dust from Highway 40 and

Nucleus Avenue is the major TSP contributor. These streets will be rebuilt and maintained by the city to alleviate this problem Even though no daily violations were observed for the 27 samples taken in 1977, there were 5 violations observed in 1978 and 1979. The total samples taken were 55 in 1978 and 8 in 1979.

City of Missoula - The city limits of Missoula make up the area which is a primary standard nonattainment area for TSP and CO. A broader area around Missoula has a secondary standard nonattainment designation. The TSP problem can be attributed primarily to dust from unpaved roads. Primary standard violations occurred 7 days in 1977, 16 days in 1978 and 10 days in 1979.

Carbon monoxide due primarily to motor vehicles and the air stagnation producing topography of this area (a valley) cause the continuing CO alert and primary standard violation occurrences. Most of the data for 1977 and 1978 was accumulated from the station near the center of the city at Brooks and South Avenue. This station was moved for part of 1978 and 1979 to a location at Bancroft and Kent (a suburban residential location). The number of daily violations diminished but there were still one alert and 9 primary violation days for the 136 days sampled at the Bancroft and Kent site.

Billings Area - Because of frequent secondary TSP violations the area bounded by 6th Avenue N on the north, 2nd Avenue S on the south, 25th Street on the east and 33rd Street on the west comprise the designated nonattainment area. Reentrained dust from paved roads is a major problem. A planned pilot sweeping and flushing program will be started to alleviate the TSP problem. Six stations showed no primary standard violation days in 1979. However, the six stations had 11 secondary violation days of the 165 days sampled. No primary violations were noted in 1977 or 1978, with only 3 primary violation days in 1979.

Great Falls Area - This area is bounded by 2nd Avenue N on the north, 2nd Avenue S on the south, 10th Street on the east and the Missouri River on the south. It is designated nonattainment for secondary violations of TSP. Windblown particulate matter from street sanding is a major problem. No primary violations were noted in 1978, 1979 and 1980 for the stations that sampled 93, 126 and 57 days respectively. Only 4 secondary violations were recorded in 1980.

Great Falls has recently been made a primary level violation nonattainment area for carbon monoxide. One station was used for sampling CO and this showed 4 primary level violation out of 94 sampling days in 1979. The years 1977 and 1978 also showed 4 and 10 primary level violations respectively The station location between 1977 and 1979 was at the center of the city near the commercial district. The 1980 sampling of 128 days showed only 1 primary level violation. However, the station was moved in 1980 to a suburban-commercial district. This might have accounted for the lower violation rate and arithmetic mean.

Butte Area - The northeast section of Butte is currently designated nonattainment for primary TSP violations. Fugitive dust emission violations declined in 1980. This pollutant is caused by the open pit mine owned by Anaconda Copper Company and unpaved roads. Only one primary violation day was noted for 133 days sampled. Five primary violation days were noted out of 240 days sampled at six stations in 1979. Only two primary standard violations were noted in 1977 and no violations occurred in 1978. These stations were sampled for 44 days in 1977 and 181 days in 1978.

East Helena Area - The designation of nonattainment for primary level $SO_2$ violations covers an area of about one-half mile radius around the ASARCO smelter. A 1400-foot square area in the northeast corner of the $SO_2$ area has been designated a nonattainment TSP area because of secondary standard violations. The ASARCO lead smelter causes the majority of the TSP emission problems. One TSP sampling site is located in the East Helena area. Starting in 1980 Helena sites showed no primary level TSP violations in 1977 thru 1979. The East Helena site showed 2 secondary standard violations of 39 samples taken in 1980.

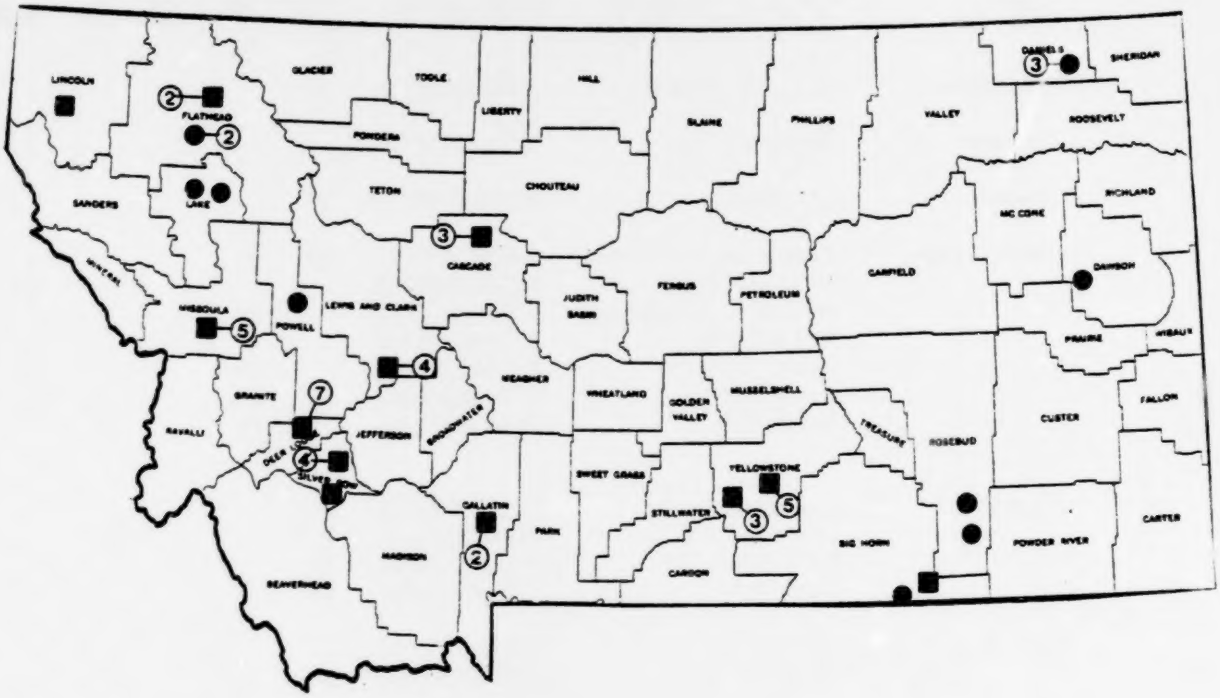
A station is set up in Montana City four miles SSE of the ASARCO plant to monitor $SO_2$. No violations of the primary standard were shown at this site for 1977 thru 1979 even though there were 290, 183 and 133 days of sampling respectively. Eighty percent of the emissions are from 400-foot stacks, while the remaining 20 percent of the emissions are from 110-foot stacks and subject to down wash. Taller stacks (375 feet) have been suggested as a replacement to the 110-foot stacks to solve down wash problems. In 1980 a station was functioning in East Helena. No violations occurred for 272 sampling days.

Laurel Area - An area of about 1.5 mile radius around the Cenex Refinery is the area designated nonattainment for primary $SO_2$ standard violations. One site used for monitoring showed 14 and 10 primary violation days in 1978 and 1979, respectively, down from 33 in 1977. The number of days sampled has decreased over the trend period to 94 days in 1980 (only January thru June). Only two primary level violations occurred in 1980.

Anaconda Area - A-6 mile square area centered at the Anaconda Copper smelter constitutes the nonattainment area designated because of $SO_2$ violations. The Anaconda smelter was shut down in September 1980. No violations occurred after August 2, 1980.

City of Billings - The area bounded by 6th Avenue N on the north, the Burlington Northern tracks on the south, U.S. 87 on the east and Division Street on the west has been designated as nonattainment for carbon monoxide violations. Motor vehicle emissions cause almost all the CO problems. No data were collected in 1979 or 1980 at any site in Billings. Only one station was used for 1977, 1978 and 1980. This showed three daily violations of 276 sample days taken in 1977, no violations for 82 sample days taken in 1978, and no iviolations for 73 sample days in 1980. Three major intersections need modifications to help alleviate this problem area.

Billings was changed from nonattainment to unclassified for ozone. No ozone data was collected in 1978, 1979, or 1980.


LINCOLN
FLATHEAD
GLACIER
TOOLE
LIBERTY
HILL
BLAINE
PHILLIPS
VALLEY
DANIELS
SHERIDAN
ROOSEVELT
PONDERA
TETON
CHOUTEAU
SANDERS
LAKE
MINERAL
CASCADE
RICHLAND
MC CONE
GARFIELD
DAWSON
FERGUS
PETROLEUM
JUDITH BASIN
LEWIS AND CLARK
POWELL
MISSOULA
MEAGHER
WHEATLAND
GOLDEN VALLEY
MUSSELSHELL
PRAIRIE
WIBAUX
GRANITE
RAVALLI
JEFFERSON
BROADWATER
DEER LODGE
SILVER BOW
TREASURE
ROSEBUD
CUSTER
FALLON
SWEET GRASS
YELLOWSTONE
STILLWATER
GALLATIN
PARK
BIG HORN
POWDER RIVER
CARTER
MADISON
BEAVERHEAD
CARBON
③
②
②
③
⑤
④
⑦
④
②
③
⑤

MONTANA

MONITORING SITES

■ Stations with 75% or more of maximum possible data

● Stations with less than 75% of maximum possible data

## MONTANA

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station No. | TSP | $SO_2$ | CO | $O_x$ | Lead |
|---|---|---|---|---|---|---|---|
| Big Horn | N.E. of Decker | 270060009F03 | X | | | | |
| Cascade | Great Falls | 270660016F01 | | | | | X |
| Dawson | Lindsay | 270360004F03 | X* | | | | |
| Deer Lodge | Anaconda-Lincoln | 270020007F01 | X* | X | | X | X |
| | Highway Jct. | 270400004F02 | | | | | X* |
| | Mill Cr. Crossing | 270400012F02 | | X* | | | |
| | Mill Creek | 270400804J02 | | X* | | | |
| | Water Office | 270400801J01 | | X* | | | |
| | Opportunity | 270400803J02 | | X* | | | |
| | Westgate | 270400807J02 | | X* | | | |
| Flathead | Columbia Falls | 270270005F01 | X | | | | |
| | Columbia Falls | 270480029F02 | X | | | | |
| | Kalispell | 270480304F05 | X* | | | | |
| | Kalispell | 270800014F01 | X* | | | | |
| Gallatin | Bozeman | 270120001F01 | X | | | | |
| | Bozeman | 270120002F01 | X* | | | | |
| Lake | Ronan | 270820010F05 | X* | | | | |
| | Ronan | 270820011F05 | X* | | | | |
| | Polson | 270820010F05 | X* | | | | |
| Lewis & Clark | Helena | 270720001F01 | X* | | | | |
| | Helena | 270860002F02 | X | | | | X |
| | Helena | 270720001F07 | X* | | | | X* |
| | E. Helena | 270860008F02 | X | | | | |
| Lincoln | Libby | 270900010F01 | X | | | | |
| Missoula | Missoula-Lions Pk. | 271100019F01 | X* | | X* | X* | X* |
| | Missoula | 271100020G01 | X* | | | | |
| | Missoula | 271100001G01 | X | | | | |
| | Missoula | 271100015G02 | X* | | | | |
| | Missoula | 271100016G02 | X* | | | | |
| Powell | Ovando | 271260024F03 | X* | | | | |
| Rosebud | Ashland | 270310101A02 | | | | X* | |

*Status Only

# MONTANA

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station No. | TSP | $SO_2$ | CO | $O_x$ | LEAD |
|---|---|---|---|---|---|---|---|
| Silverbow | Butte | 270160006F01 | X | | | | X* |
| | Tierney | 271480014F02 | X | | | | |
| | Butte | 270160020F01 | X* | | | | X* |
| | Butte | 270160018F01 | | | | X* | X* |
| | Butte | 270160019F01 | X | | | | X* |
| Yellowstone | Billings | 270080059F01 | X* | | | X* | X* |
| | Billings | 270080007G01 | X | | | | |
| | Billings | 270080008G01 | X | | | | |
| | Billings | 270080009G01 | X | | | | |
| | Laurel | 270840001G02 | X | X* | | | |
| | Laurel | 270840009F01 | | X* | | | |
| | Laurel | 270840009F05 | | X* | | | |

Status Only

## MONTANA
## STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN 75% OR MAXIMUM DAYS

| County | City or Location | Station Number | TSP |
|---|---|---|---|
| Big Horn | Decker-Warren Ranch | 270060009F03 | X |
| Cascade | Great Falls | 270660009G01 | X |
| | Kiwanis Park | 270660016F01 | X |
| Daniels | Scoby | 270340001F03 | X |
| | Scoby | 270340002F03 | X |
| | Scoby | 270340003F03 | X |
| Rosebud | BN Site | 271360027F02 | X |
| Yellowstone | Billings | 270080006F05 | X |

# AIR QUALITY TRENDS
# BASED ON STANDARD VIOLATIONS

## MONTANA

## NONATTAINMENT AREAS

| | | Total Suspended Particulates | | | | Carbon Monoxide | | | |
|---|---|---|---|---|---|---|---|---|---|
| Nonattainment Area | Year | Days Sampled | Geometric Mean [a] (ug/m$^3$) | Violation Days | No. of Stations | Days Sampled | Arithmetic Mean [a] (mg/m$^3$) | Violation Days | No. of Stations |
| Colstrip Area | 1977 | 27 | 19 | P-0 | 1 | | | | |
| | 1978 | 13 | 14 | P-0 | 1 | | | | |
| | 1979 | 32 | 22 | P-0 | 5 | | | | |
| | 1980 | 4 | 68 | P-0 | 2 | | | | |
| City of Columbia Falls | 1977 | 27 | 82 | P-0 | 1 | | | | |
| | 1978 | 55 | 93 | A-3/P-5 | 2 | | | | |
| | 1979 | 60 | 111 | A-2/P-8 | 1 | | | | |
| | 1980 | 53 | 86 | A-2/P-2 | 2 | | | | |
| City of Missoula | 1977 | 365 | 52 | P-7 | 8 | 290 | 5.9 | A-12/P-133 | 1 |
| | 1978 | 360 | 66 | A-6/P-16 | 9 | 150 | 5.9 | A-21/P-66 | 2 |
| | 1979 | 365 | 60 | A-1/P-10 | 6 | 136 | 2.0 | A-1/P-9 | 1 |
| | 1980 | 249 | 65 | A-5/P-8 | 5 | 7 | 2.6 | P-1 | 1 |

---

[a] Average of the Geometric or Arithmetic Means for all Stations
A = Alert Violation Days
P = Primary Standard Violation Days

# AIR QUALITY TRENDS
# BASED ON STANDARD VIOLATIONS

## MONTANA

## NONATTAINMENT AREAS

| | | Total Suspended Particulates | | | | Carbon Monoxide | | | |
|---|---|---|---|---|---|---|---|---|---|
| Nonattainment Area | Year | Days Sampled | Geometric Mean $^a$ (ug/m$^3$) | Violation Days | No. of Stations | Days Sampled | Arithmetic Mean $^a$ (Mg/m$^3$) | Violation Days | No. of Stations |
| Billings Area | 1977 | 60 | 46 | P-0 | 4 | | | | |
| | 1978 | 138 | 39 | P-0 | 7 | | | | |
| | 1979 | 303 | 63 | P-3 | 5 | | | | |
| | 1980 | 165 | 60 | P-0 | 6 | | | | |
| Great Falls Area | 1977 | 99 | 62 | A-1/P-1 | 2 | 161 | 2.7 | P-4 | 1 |
| | 1978 | 93 | 40 | P-0 | 4 | 57 | 3.6 | P-10 | 1 |
| | 1979 | 126 | 51 | P-0 | 4 | 94 | 3.0 | P-4 | 1 |
| | 1980 | 57 | 48 | P-0 | 9 | 128 | .9 | P-1 | 1 |
| Butte Area | 1977 | 44 | 52 | P-2 | 5 | | | | |
| | 1978 | 131 | 46 | P-0 | 8 | | | | |
| | 1979 | 240 | 67 | P-5 | 6 | | | | |
| | 1980 | 133 | 57 | P-1 | 6 | | | | |

---

[a] Average of the Geometric or Arithmetic Mean for all Stations
A = Alert Violation Days
P = Primary Standard Violation Days

## AIR QUALITY TRENDS
## BASED ON STANDARD VIOLATIONS

## MONTANA

## NONATTAINMENT AREAS

| | | Total Suspended Particulates | | | | Sulfur Dioxide | | | | Carbon Monoxide | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nonattainment Days | Year | Days Sampled | Geom. Mean [a] (ug/m$^3$) | Viol. Days | No. of Stations | Days Sampled | Arith. Mean [a] (ug/m$^3$) | Viol. Days | No. of Stations | Days Sampled | Arith. Mean [a] (Mg/m$^3$) | Viol. Days | No. of Stations |
| E. Helena Area | 1977 | 48 | 54 | P-0 | 2 | 290 | 27 | P-0 | 1 | | | | |
| | 1978 | 68 | 53 | P-0 | 3 | 183 | 18 | P-0 | 1 | | | | |
| | 1979 | 59 | 60 | P-0 | 2 | 133 | 19 | P-0 | 1 | | | | |
| | 1980 | 40 | 54 | P-0 | 1 | 266 | 24 | P-0 | 1 | | | | |
| Laurel Area | 1977 | | | | | 191 | 151 | P-33 | 2 | | | | |
| | 1978 | | | | | 75 | 130 | A-2/P-14 | 2 | | | | |
| | 1979 | | | | | 172 | 104 | P-10 | 2 | | | | |
| | 1980 | | | | | 94 | 48 | P-2 | 2 | | | | |
| Anaconda Area | 1977 | | | | | 365 | 54 | A-8/P-28 | 10 | | | | |
| | 1978 | | | | | 363 | 71 | A-48/P-136 | 11 | | | | |
| | 1979 | | | | | 335 | 81 | A-3/P-18 | 9 | | | | |
| | 1980 | | | | | 324 | 84 | A-13/P-60 | 7 | | | | |
| City of Billings | 1977 | | | | | | | | | 226 | 2.6 | P-3 | 1 |
| | 1978 | | | | | | | | | 82 | 2.0 | P-0 | 1 |
| | 1979 | | | | | | | | | 0 | --- | --- | 0 |
| | 1980 | | | | | | | | | 73 | 7.3 | P-0 | 1 |

---

[a] Average of the Geometric or Arithmetic means for all Stations

$\overline{A}$ = Alert Violation Days

P = Primary Standard Violations

## NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS EXCEEDED IN 1980

## MONTANA

### TOTAL SUSPENDED PARTICULATES

| County | (City or Location) | Days Sampled |
|---|---|---|
| Flathead | (Columbia Falls) | 51 |
| Lincoln | (Libby) | 37 |
| Missoula | (Wood St. & W. Pine) | 218 |
| | (Lions Park) | 161 |
| | (Rose Park) | 113 |
| Silver Bow | (Butte) | 59 |

### SULFUR DIOXIDE

| County | (City or Location) | Days Sampled |
|---|---|---|
| Deer Lodge | (Anaconda-Lincoln) | 285 |
| | (Mill Cr. Cross) | 100 |
| | (Westgate) | 99 |
| Yellowstone | (Laurel) | 139 |

### CARBON MONOXIDE

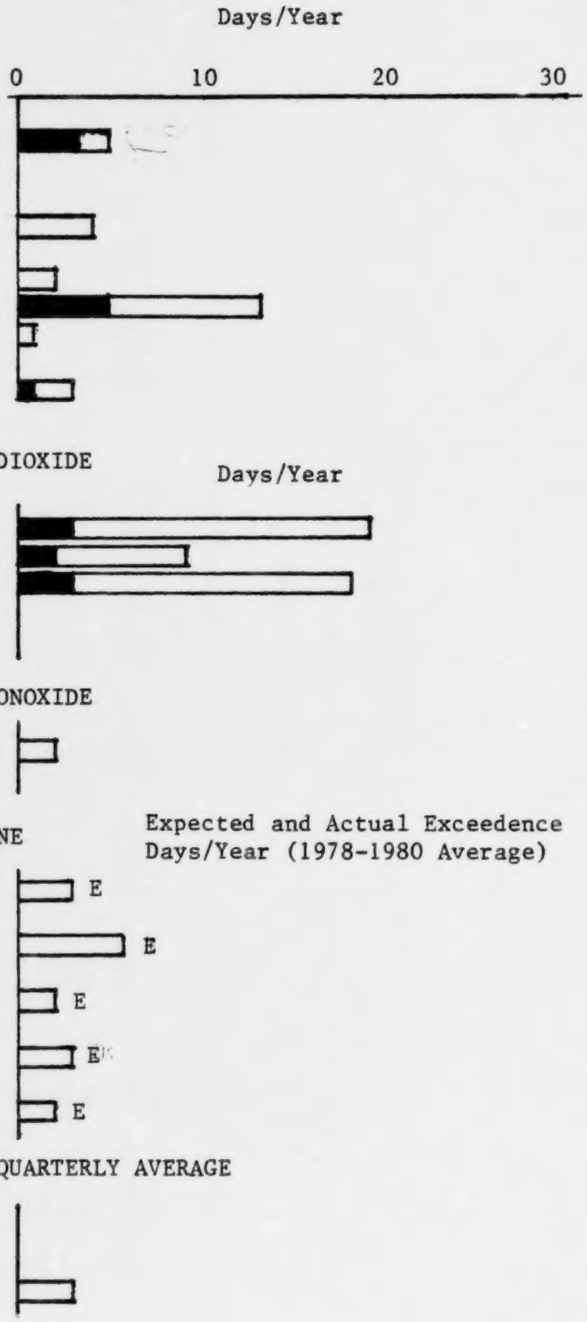
| County | (City or Location) | Days Sampled |
|---|---|---|
| Missoula | (Lions Park) | 77 |

### OZONE

| County | (City or Location) | Days Sampled |
|---|---|---|
| Deer Lodge | (Anaconda) | 104 |
| Missoula | (Lions Park) | 94 |
| Rosebud | (Ashland) | 206 |
| Silver Bow | (Butte) | 213 |
| Yellowstone | (Billings) | 173 |

### LEAD - VIOLATIONS-QUARTERLY AVERAGE

| County (City or Location) | Quarters Sampled |
|---|---|
| Lewis & Clark (Helena) | 3 |



▭ Primary level exceeded
■ Alert level exceeded
( ) Annual Geometric Mean μg/m$^3$

## STATUS AND TRENDS IN AIR QUALITY

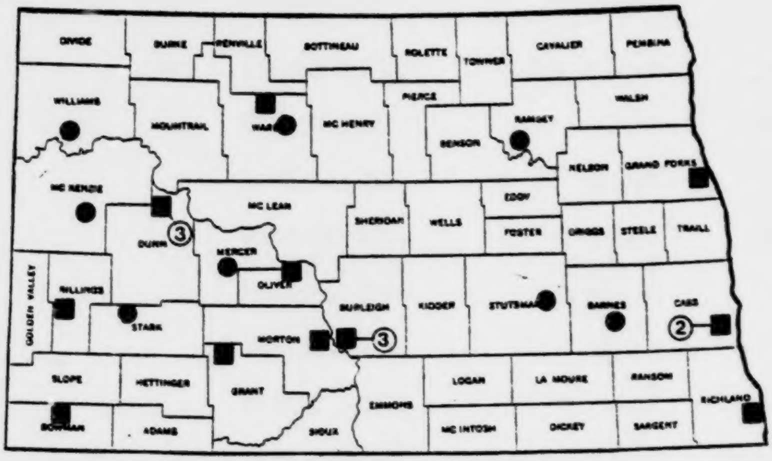
## MONTANA

| County | TSP | SO2 | CO | LEAD | County | TSP | SO2 | CO | LEAD |
|---|---|---|---|---|---|---|---|---|---|
| Big Horn | ⇨ | | | | Lake | □ | | | |
| Cascade | □ | | | □ | Lewis and Clark | ⇨ | | | ▣ |
| Daniels | ⇨ | | | | Lincoln | ⇧▣ | | | |
| Dawson | □ | | | | Missoula | ➡ | | ▣ | □ |
| Deer Lodge | □ | ➡ | | □ | Rosebud | □ | | | |
| Flathead | ⬇ | | | | Silver Bow | ➡ | | | □ |
| Gallatin | ⇨ | | | | Yellowstone | ⇨ | ▣ | | □ |
| Jefferson | | | | □ | | | | | |

| | |
|---|---|
| □ | No evidence standard exceeded |
| ▣ | Exceeds primary standard |
| ■ | Exceeds alert level |
| ⇧ | Improvement |
| ⇨ | No apparent trend |
| ⇩ | Deterioration |

## North Dakota Air Quality

Total suspended particulates were sampled in 16 counties. High readings caused by the Mt. St. Helen's eruption debris were ignored. No station exceeded primary TSP standards in the State in 1980. Two stations sampled $SO_2$ and $NO_2$. These sites showed no violations for these pollutants. Ozone was sampled in two stations during 1980, (even though no actual violations occurred). The average level of expected exceedences for 1978-1980 was 3 per year. Lead sampling started during the last half of 1979 at 6 stations on 6 day intervals. No violations occurred for any of these stations during 1980.


DIVIDE
BURKE
RENVILLE
BOTTINEAU
ROLETTE
TOWNER
CAVALIER
PEMBINA
WILLIAMS
MOUNTRAIL
WARD
MC HENRY
PIERCE
BENSON
RAMSEY
WALSH
NELSON
GRAND FORKS
MC KENZIE
MC LEAN
SHERIDAN
WELLS
EDDY
FOSTER
GRIGGS
STEELE
TRAILL
DUNN
③
MERCER
OLIVER
GOLDEN VALLEY
BILLINGS
STARK
BURLEIGH
KIDDER
STUTSMAN
BARNES
CASS
②
MORTON
③
SLOPE
HETTINGER
GRANT
EMMONS
LOGAN
LA MOURE
RANSOM
RICHLAND
BOWMAN
ADAMS
SIOUX
MC INTOSH
DICKEY
SARGENT

NORTH DAKOTA

MONITORING SITES

■ Stations with 75% or more of maximum possible data

● Stations with less than 75% of maximum possible data

# NORTH DAKOTA

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station No. | TSP | $SO_2$ | $NO_2$ | CO | $O_x$ | LEAD |
|---|---|---|---|---|---|---|---|---|
| Barnes | Valley City | 351240001F01 | X* | | | | | |
| Billings | Medora | 350080001F03 | X | X* | | | | |
| Bowman | Bowman | 350160001F01 | X | | | | | |
| Burleigh | Bismarck | 350200003F09 | | | | | | X* |
| | Bismarck | 350100001F01 | X | | | | | X* |
| | Bismarck | 350200011F03 | | | | | X* | |
| Guss | Fargo | 350400001F01 | | | | | | X* |
| Dunn | Dunn | 350340003F03 | | | | | X* | |
| Grand Forks | Grand Forks | 350480001F01 | X | | | | | X* |
| Grant | Glen Ullin | 350520001F03 | X | | | | | |
| McKenzie | Roosevelt N.F. | 350700002F03 | X | X* | | | | |
| Mercer | Beulah | 350760001F01 | X* | | X* | | | |
| Morton | Mandan | 350740001F01 | X | | | | | |
| Oliver | Stanton | 350860001F03 | | X | | | | |
| Ramsey | Devils Lake | 350260001F01 | X* | | | | | |
| Richland | Wahpeton | 351260001F01 | X | | | | | |
| Stark | Dickinson | 350300001F01 | X* | | | | | |
| Stutsman | Jamestown | 350580001F01 | X* | | | | | |
| Ward | Minot | 350780001F01 | X* | | | | | X* |
| | Lake Darling | 351300001F03 | X | | | | | X* |
| Williams | Williston | 351360001F01 | X* | | | | | |

*Status Only

## NORTH DAKOTA

## STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN 75% OF MAXIMUM DAYS

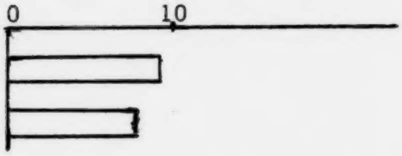
| County | City or Location | Station Number | TSP | $SO_2$ |
|---|---|---|---|---|
| Cass | Fargo | 350220001F03 | X | |
| Dunn | Mandaree | 350340001F01 | X | |
| | Dunn | 350340003F03 | | X |

## NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS EXCEEDED IN 1980

### NORTH DAKOTA

### OZONE

| County (City or Location) | Days Sampled |
|---|---|
| Dunn (Dunn Center) | 211 |
| Mercer (Beulah) | 133 |



Expected Exceedence Days/Year (1978-1980 Data Average)

# STATUS AND TRENDS IN AIR QUALITY

## NORTH DAKOTA

| County | TSP | SO2 | NO2 | Ox | LEAD | County | TSP | SO2 | NO2 | Ox | LEAD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Barnes | ☐ | | | | | Mercer | ☐ | | ☐ | ▣ | |
| Billings | ☐ | ☐ | | | | Morton | ⇨ | | | | |
| Bowman | ⇨ | | | | | Ramsey | ☐ | | | | |
| Burleigh | ☐ | | | | ☐ | Richland | ☐ | | | | |
| Cass | ⇨ | | | | ☐ | Oliver | ☐ | | | | |
| Dunn | | | ☐ | ▣ | | Stark | ☐ | | | | |
| Grand Forks | ☐ | | | | ☐ | Stutsman | ☐ | | | | |
| Grant | ⇨ | | | | | Ward | ⇨ | | | | ☐ |
| McKenzie | ☐ | | | | | Williams | ☐ | | | | |
| McLean | | ☐ | | | | | | | | | |

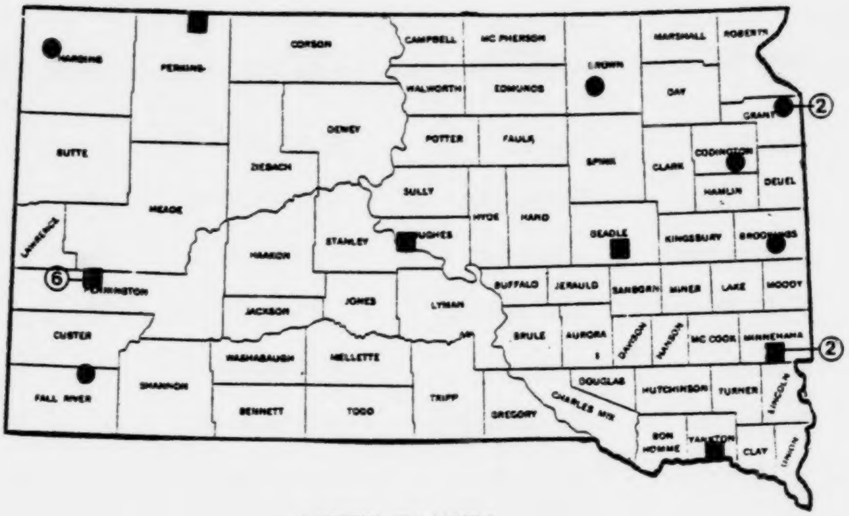
| | |
|---|---|
| ☐ | No evidence standard exceeded |
| ▣ | Exceeds primary standard |
| ■ | Exceeds alert level |
| ⇧ | Improvement |
| ⇨ | No apparent trend |
| ⇩ | Deterioration |

## South Dakota Air Quality

Total suspended particulate (TSP), $SO_2$ and $NO_2$ are the only air pollutants monitored in South Dakota. The five stations located in the Rapid City area showed 1 alert level and 5 primary level TSP violation days in 1980. This is a deterioration from the 1977 and 1978 levels, but remains approximately the same as 1979. Measurements for $SO_2$ and $NO_2$ in 6 counties showed no primary or secondary violations. The concentrations were generally at minimum levels.

## Status of Nonattainment Areas in South Dakota

Rapid City Area - The nonattainment area designated for TSP primary violations is a 10 mile (north-south) by 11 mile (east-west) rectangular area centered at Rapid City. Most of the violations have been caused by fugitive emissions from quarry operations. Requirements have been adopted for fugitive dust emission controls which should result in attainment by 1982. Five stations measured five primary and one alert violation days for 61 days sampled in 1980. There were three primary violation days in 1977, one in 1978, and 3 primary plus 2 alert level violations in 1979.


HARDING
PERKINS
CORSON
CAMPBELL
MC PHERSON
BROWN
MARSHALL
ROBERTS
WALWORTH
EDMUNDS
DAY
GRANT
②
DEWEY
POTTER
FAULK
SPINK
CLARK
CODINGTON
DEUEL
HAMLIN
BUTTE
ZIEBACH
SULLY
HYDE
HAND
MEADE
LAWRENCE
STANLEY
HUGHES
BEADLE
KINGSBURY
BROOKINGS
HAAKON
⑥
PENNINGTON
BUFFALO
JERAULD
SANBORN
MINER
LAKE
MOODY
JACKSON
JONES
LYMAN
CUSTER
BRULE
AURORA
DAVISON
HANSON
MC COOK
MINNEHAHA
②
WASHABAUGH
MELLETTE
DOUGLAS
HUTCHINSON
TURNER
LINCOLN
FALL RIVER
SHANNON
BENNETT
TODD
TRIPP
GREGORY
CHARLES MIX
BON HOMME
YANKTON
CLAY
UNION

SOUTH DAKOTA

MONITORING SITES

■ Stations with 75% or more of maximum possible data

● Stations with less than 75% of maximum possible data

## SOUTH DAKOTA

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station No. | TSP | $SO_2$ | $NO_2$ |
|---|---|---|---|---|---|
| Beadle | Huron | 430820001F01 | X | | |
| Brookings | Brookings | 430140001F01 | X* | | |
| Codington | Waterton | 431760001F01 | X* | | |
| Fall River | Hot Springs | 430780001F03 | X* | | |
| Hughes | Pierre | 431340001F01 | X | X* | X |
| Minnehaha | Sioux Falls | 431480004F01 | X | X* | X* |
| Pennington | Rapid City | 431380001F01 | X | X | X |
| | Rapid City | 431380007F01 | X* | | |
| | Rapid City | 431380002F01 | X | | |
| | Rapid City | 431380005F01 | X | | |
| | Rapid City | 431380006F01 | X | | |
| Perkins | Lemmon | 431320001F03 | X | X* | X* |
| Yankton | Yankton | 431800001F03 | X | | |

*Status Only

## SOUTH DAKOTA

## STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN 75% OF MAXIMUM DAYS

| County | City or Location | Station No. | TSP | $SO_2$ | $NO_2$ |
|---|---|---|---|---|---|
| Brown | Aberdeen | 430020001F01 | X | | |
| Grant | NE Big Stone Plant | 430640002F02 | X | | |
| | SE Big Stone Plant | 430640001F02 | X | X | X |
| Harding | Buffalo | 430760001F01 | X | X | X |
| Minnehaha | Sioux Falls | 430180002F01 | X | | |
| Pennington | Rapid City | 431380009F01 | X | | |

# AIR QUALITY TRENDS
# BASED ON STANDARD VIOLATIONS

## SOUTH DAKOTA

## NONATTAINMENT AREAS

| Nonattainment Area | Year | Total Suspended Particulates | | | |
|---|---|---|---|---|---|
| | | Days Sampled | Avg. of Geom. Mean of Stas. ($\mu g/m^3$) | Violation Days | Number of Stations |
| Rapid City Area | 1977 | 53 | 42 | P-3 | 4 |
| | 1978 | 56 | 52 | P-1 | 4 |
| | 1979 | 62 | 70 | A-2/P-3 | 7 |
| | 1980 | 61 | 67 | A-1/P-4 | 5 |

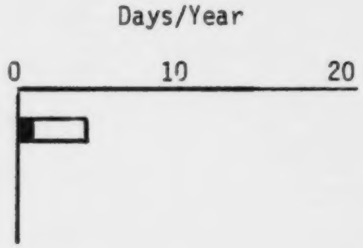
A - Alert Violation Days
P - Primary Standard Violation Days

# NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS EXCEEDED IN 1980

## SOUTH DAKOTA

## TOTAL SUSPENDED PARTICULATES

| County (City or Location) | Days Sampled |
|---|---|
| Pennington (Rapid City) | 60 |



▭ Primary level exceeded

■ Alert level exceeded

## STATUS AND TRENDS IN AIR QUALITY

## SOUTH DAKOTA

| County | TSP | $SO_2$ | $NO_2$ |
|---|---|---|---|
| Beadle | ☐ | | |
| Brookings | ☐ | | |
| Codington | ☐ | | |
| Fall River | ☐ | | |
| Grant | ☐ | | |
| Hughes | ⇨ | | ☐ |
| Minnehaha | ⇨ | ☐ | ☐ |
| Pennington | ➡ | ☐ | ☐ |
| Perkins | ⇨ | ☐ | ☐ |
| Richland | ⇨ | | |
| Yankton | ⇨ | | |

| | |
|---|---|
| ☐ | No evidence standard exceeded |
| ▣ | Exceeds primary standard |
| ■ | Exceeds alert level |
| ⇧ | Improvement |
| ⇨ | No apparent trend |
| ⇩ | Deterioration |

## Utah Air Quality

Total suspended particulate violations increased in 1980 compared to 1979 for Salt Lake and Utah Counties. Only Weber County showed a decrease in TSP violations (0 in 1980) Even though the TSP emitted by Kennecott Copper has diminished, U.S. Steel in Orem appears to be a contributor to TSP pollution in the Wasatch Front Counties. All of the cities in the Wasatch Front Counties (Davis, Salt Lake, Utah and Weber) still have actual and expected violations for ozone and carbon monoxide. Three $SO_2$ violation days occurred in Salt Lake County of 364 days sampled in 1980. No lead data is in the EPA SAROAD data system for 1980. Both industrial and motor vehicle pollution prevail in this area.

## Status of Nonattainment Areas in Utah

Changes in nonattainment status - The City of Price in Carbon County was changed in 1979 from a nonattainment area with primary violation status in TSP to an unclassified area. No samples were taken in 1979 but 1978 data showed that the site had not exceeded the primary standard. The nonattainment status for TSP of Cedar City in Iron County was changed in 1979 to an unclassified designation. No ozone data from Uintah County was found in the EPA data system for 1977, 1978, or 1979. Uintah County ozone nonattainment status was dropped in 1979. The ozone nonattainment status for Utah and Weber County has also been changed to unclassified. For 1980 Utah and Weber Counties show an expected exceedence rate for ozone of 4 and 9 days respectively.

A nonattainment designation for total suspended particulates still remains for Davis, Salt Lake, Utah, and Weber Counties, although boundaries were recently changed to make the areas smelter, subcounty designations. Fugitive dust from unpaved roads and industrial emission sources are the main causes of TSP problems.

Davis County - City of Bountiful Areas - The only TSP data taken for 1978, 1979, and 1980 was at the Bountiful site. Davis County was designated nonattainment for secondary TSP violations. The years 1978, 1979, and 1980 showed no primary level TSP violation but each year showed 6, 18, and 16 secondary level violation days respectively for 333, 334, and 337 days sampled. In 1977 one alert level and two primary level violations were noted. Davis County is also a nonattainment area for ozone because of primary level violations. Refineries in the area and motor vehicle emissions are the main causes. The meteorology and topography of the area inhibit dispersion. Mountains are on both sides of this area. Air inspection and maintenance program being implemented by Salt Lake and Davis County agencies should help reduce both the ozone and carbon monoxide problems in the county. The ozone violation day level remained relatively constant from 1977 to 1979. There have been primary violations of 8, 8 and 10 in 1977 thru 1979 respectively. The year 1980 showed only 2 primary level violations. The City of Bountiful was designated nonattainment for primary level carbon monoxide violations. Again motor vehicles appear to be the primary cause of the CO violations. The 1977 thru 1979 average of primary violation days is less than 4 per year. The year 1980 showed 3 primary violation days for 343 days sampled.

Salt Lake County - Salt Lake City Areas - TSP primary and alert level violations occurred in Salt Lake County. Part of the high concentrations were contributed by sources at the Kennecott Copper Company. The number of primary violations have remained the same for 1978 thru 1980 (9, 9 and 11 violation days each year). This is down considerably from 33 violation days in 1977. TSP alert level violations ranged from 2 to 4 per year for this period.

Ambient air quality violation of the sulfur dioxide standard have diminished considerably since the construction of the new tall stack at the Kennecott Copper Company smelter near Magna. The primary violation days have decreased in the last four years. They were 64, 15, four and three days for 1977 thru 1980 respectively.

Salt Lake County ozone problems caused primarily by motor vehicles should be reduced with the implementation of the county-operated inspection and maintenance program. The Salt Lake Health Department monitoring site showed three and four primary level violations exceedences in 1978 and 1979. An increased amount of violations (11 violation days) occurred in 1980.

Carbon monoxide violation days for the City of Salt Lake still remain high. They have declined from 40 violation days in 1977 to 16 in 1980. However, there were still two alert level days in 1980.

Utah County - Provo Areas - One of the main causes of TSP violations in this area is the U.S. Steel plant west of Orem. Of the three TSP measuring sites located in Utah County, a drastic rise of daily TSP violations were noted in 1980. The years 1978 and 1979 had 0 and 2 primary violation days while 1980 showed 10 alert and 17 primary violation days.

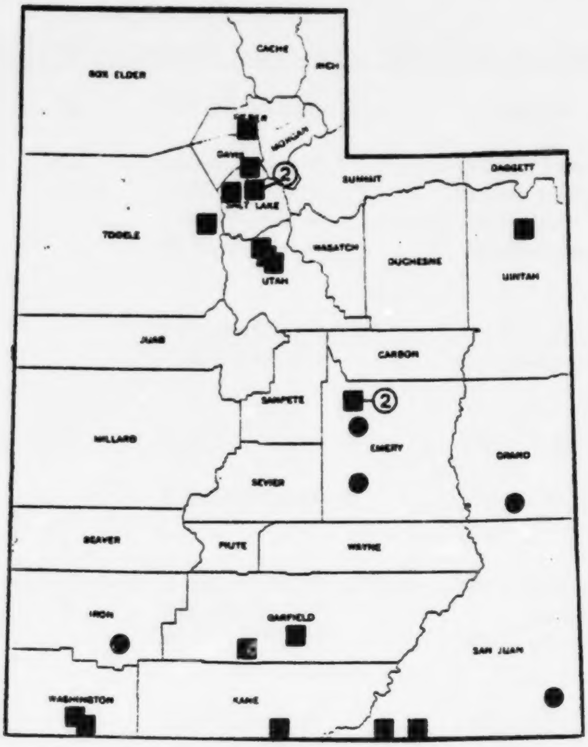
The CO site at Provo showed a rise to 17 primary violations in 1980 versus 7 and 4 in 1978 and 1979 respectively.

Weber County - Ogden Areas - The station at Ogden is the only station used to monitor TSP for Weber County. Primary level daily violations have remained approximately the same for 1977 thru 1979 with three primary and one alert level violation day being noted in 1979. No primary violations were recorded for TSP in 1980.

Motor vehicle emissions still are a major problem in Ogden. However, only 6 primary CO violations occurred in 1980. Primary daily CO violations numbered 12 and 14 in 1978 and 1979. This is down from 36 CO violation days in 1977.

Cedar City Area - Cedar City in Iron County was designated a nonattainment area for $SO_2$. The cause for the designation was the burning of high sulfur oil for heating a building. No primary violations occurred in 1979 or 1980 because the fuel oil was changed to low sulfur type in accordance with State regulations.

Tooele County Area - The East Tooele monitoring site showed no primary level TSP violations in 1978, 1979, or 1980. The original cause of violations was the emissions from the copper smelter owned by Kennecott Copper Company. The corrective change made by Kennecott has caused this decrease in primary violations.


BOX ELDER
CACHE
RICH
WEBER
DAVIS
MORGAN
②
SUMMIT
DAGGETT
SALT LAKE
TOOELE
UTAH
WASATCH
DUCHESNE
UINTAH
JUAB
CARBON
SANPETE
②
MILLARD
EMERY
GRAND
SEVIER
BEAVER
PIUTE
WAYNE
IRON
GARFIELD
SAN JUAN
WASHINGTON
KANE

UTAH

MONITORING SITES

■ Stations with 75% or more of maximum possible data

● Stations with less than 75% of maximum possible data

## UTAH

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station Number | TSP | $SO_2$ | $NO_2$ | CO | Ox | LEAD |
|---|---|---|---|---|---|---|---|---|
| Davis | Bountiful | 460060001F01 | X | X | X | X | X | |
| Emery | Castledale | 460280004F02 | X* | X* | X* | | | |
| | Green River | 460280005F02 | X* | | | | | |
| | Huntington Canyon | 460280001K03 | | | | | | X |
| | Huntington #2 | 460280003K03 | | | | | | X |
| Garfield | Escalante | 460300002K03 | | | | | | X |
| | Henrieville | 460300003K03 | | | | | | X |
| Iron | Cedar City | 460160002F01 | X* | X* | | | | |
| Kane | Glen Canyon | 460400003K03 | | | | | | X |
| Salt Lake | Health Dept. (SLC) | 460920001F01 | X | X | X | X | X | |
| | Magna | 460520001F02 | X | X | | | | |
| | State Park | 460900002F02 | | X* | | | | |
| San Juan | Navajo Mtn. | 460960001K03 | | | | | | X |
| | Olsato | 460960002K03 | | | | | | X |
| Tooele | East Tooele | 461160001F01 | X | X | | | | |
| Uintah | East Vernal | 461200001F01 | X* | X* | X | | | |
| Utah | Lindon | 461120001F01 | X | | | | | |
| | Pleasant Grove | 460760001F01 | X | | | | | |
| | Provo | 460800001F01 | X | | X | X* | X | |
| Washington | Bloomington | 461280001K03 | | | | | | X |
| | George | 461280002K03 | | | | | | X |
| Weber | Ogden | 460680001F01 | X | | X | X* | X | |

*Status Only

# UTAH

## STATIONS NOT USED FOR TRENDS AND/OR STATUS - LESS THAN 75% OF MAXIMUM DAYS

| County | City or Location | Station No. | TSP | $SO_2$ | $NO_2$ | LEAD |
|---|---|---|---|---|---|---|
| Emery | Green River | 400280005F02 | | X | | |
| | Castledale | 460280004F02 | | | | X |
| Grand | Moab | 460580002F01 | X | | | |
| Iron | Cedar City | 460160002F01 | | X | | |
| San Juan | Aneth | 460960003K03 | | | | X |

# AIR QUALITY TRENDS
# BASED ON STANDARD VIOLATIONS

## UTAH

## NONATTAINMENT AREAS

| | | Total Suspended Particulates | | | | Sulfur Dioxide | | | | Ozone | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nonattainment Area | Year | Days Sampled | Geom. Mean [a] ($\mu g/m^3$) | Viol. Days | Stas. | Days Sampled | Arith. Mean [a] ($\mu g/m^3$) | Viol. Days | Stas. | Days Sampled | Arith. Mean [a] (ppm) | Actual Viol. Days | Stas. |
| Davis County | 1977 | 334 | 61 | P-2/S-25 | 1 | | | | | 364 | .025 | P-8 | 1 |
| | 1978 | 333 | 52 | P-0/S-6 | 1 | | | | | 364 | .029 | A-1/P-8 | 1 |
| | 1979 | 334 | 61 | P-0/S-18 | 1 | | | | | 358 | .030 | P-10 | 1 |
| | 1980 | 337 | 57 | P-0/S-16 | 1 | | | | | 248 | .014 | P-2 | 1 |
| Salt Lake County | 1977 | 365 | 86 | A-3/P-33 | 8 | 361 | 165 | A-17/P-64 | 5 | 355 | .020 | P-0 | 1 |
| | 1978 | 363 | 74 | A-4/P-9 | 4 | 261 | 56 | A-2/P-15 | 2 | 179 | .015 | P-3 | 1 |
| | 1979 | 364 | 79 | A-2/P-9 | 3 | 263 | 54 | P-4 | 2 | 362 | .025 | P-4 | 1 |
| | 1980 | 363 | 71 | A-4/P-11 | 2 | 364 | 51 | P-3 | 4 | 354 | .017 | P-11 | 1 |
| Utah County | 1977 | 365 | 78 | A-4/P-19 | 6 | | | | | | | | |
| | 1978 | 356 | 73 | P-0 | 3 | | | | | | | | |
| | 1979 | 356 | 78 | P-2 | 2 | | | | | | | | |
| | 1980 | 365 | 70 | A-10/P-17 | 3 | | | | | | | | |
| Weber County | 1977 | 350 | 77 | A-1/P-3 | 2 | | | | | | | | |
| | 1978 | 301 | 75 | P-1 | 2 | | | | | | | | |
| | 1979 | 350 | 85 | A-1/P-3 | 1 | | | | | | | | |
| | 1980 | 347 | 68 | P-0 | 1 | | | | | | | | |

---

[a] Average of the geometric or arithmetic means for all stations
A = Alert Violation Days
P = Primary Standard Violation Days
S = Secondary Standard Violation Days

## AIR QUALITY TRENDS (Contd)
## BASED ON STANDARD VIOLATIONS

## UTAH

## NONATTAINMENT AREAS

| | | Total Suspended Particulates | | | | Sulfur Dioxide | | | | Ozone | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nonattainment Area | Year | Days Sampled | Geom. Mean a (μg/m³) | Viol. Days | Stas. | Days Sampled | Arith. Mean a (μg/m³) | Viol. Days | Stas. | Days Sampled | Arith. Mean a (ppm) | Actual Viol. Days | Stas. |
| Cedar City | 1977 | | | | | 272 | 74 | P-11 | 1 | | | | |
| | 1978 | | | | | 334 | 72 | P-7 | 1 | | | | |
| | 1979 | | | | | 334 | 21 | P-0 | 2 | | | | |
| | 1980 | | | | | 239 | 7 | P-0 | 1 | | | | |
| Tooele County | 1977 | | | | | 306 | 54 | P-7 | 1 | | | | |
| | 1978 | | | | | 305 | 28 | P-0 | 1 | | | | |
| | 1979 | | | | | 231 | 27 | P-0 | 1 | | | | |
| | 1980 | | | | | 274 | 12 | P-0 | 1 | | | | |

---

[a] Average of the geometric or arithmetic means for all stations

A = Alert Violation Days

P = Primary Standard Violation Days

S = Secondary Standard Violation Days

## AIR QUALITY TRENDS
## BASED ON STANDARD VIOLATIONS

## UTAH

## NONATTAINMENT AREAS

| Nonattainment Area | Carbon Monoxide | | | | |
|---|---|---|---|---|---|
| | Year | Days Sampled | Average Arithmetic Mean of Stations ($Mg/m^3$) | Violation Days | No. of Stations |
| City of Bountiful | 1977 | 228 | 2.1 | P-7 | 1 |
| | 1978 | 334 | 1.4 | P-0 | 1 |
| | 1979 | 334 | 1.4 | P-4 | 1 |
| | 1980 | 343 | 1.5 | P-3 | 1 |
| City of Ogden | 1977 | 341 | 3.0 | A-3/P-36 | 1 |
| | 1978 | 349 | 2.1 | P-12 | 1 |
| | 1979 | 337 | 2.2 | P-14 | 1 |
| | 1980 | 245 | 2.0 | P-6 | 1 |
| City of Provo | 1977 | 365 | 3.5 | P-23 | 1 |
| | 1978 | 277 | 2.6 | P-7 | 1 |
| | 1979 | 212 | 2.5 | P-4 | 1 |
| | 1980 | 201 | 3.5 | A-1/P-17 | 1 |
| Salt Lake City | 1977 | 359 | 1.6 | A-3/P-40 | 1 |
| | 1978 | 352 | 1.8 | P-18 | 1 |
| | 1979 | 364 | 1.7 | A-3/P-18 | 1 |
| | 1980 | 361 | 4.4 | A-2/P-16 | 2 |

A - Alert Violation Days
P - Primary Standard Violation Days

# NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS EXCEEDED IN 1979

## UTAH

### TOTAL SUSPENDED PARTICULATES

| County | (City or Location) | Days Sampled |
|---|---|---|
| Salt Lake | (Magna) | 343 |
| | (Health Department) | 340 |
| Utah | (Provo) | 321 |
| | (Pleasant Grove) | 341 |
| | (Lindon) | 356 |

### SULFUR DIOXIDE

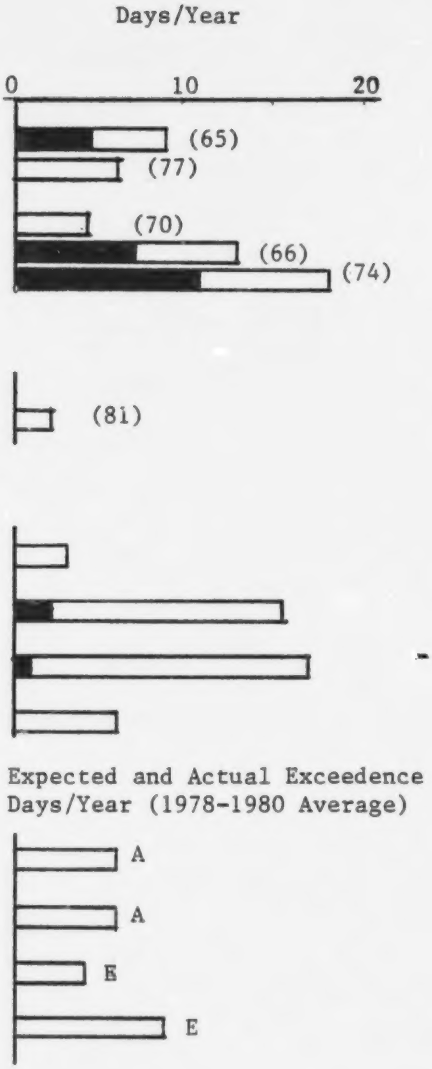
| County | (City or Location) | Days Sampled |
|---|---|---|
| Salt Lake | (Magna) | 256 |

### CARBON MONOXIDE

| County | (City or Location) | Days Sampled |
|---|---|---|
| Davis | **(Bountiful)** | 343 |
| Salt Lake | (Salt Lake Health Dept.) | 361 |
| Utah | (Provo) | 201 |
| Weber | (Ogden) | 245 |

### OZONE

| County | (City or Location) | Days Sampled |
|---|---|---|
| Davis | (Bountiful | 324 |
| Salt Lake | (Salt Lake Health Dept.) | 299 |
| Utah | (Provo) | 331 |
| Weber | (Ogden) | 301 |



☐ Primary level exceeded

■ Alert level exceeded

( ) Annual Geometric Mean $\mu g/m^3$

## STATUS AND TRENDS IN AIR QUALITY

## UTAH

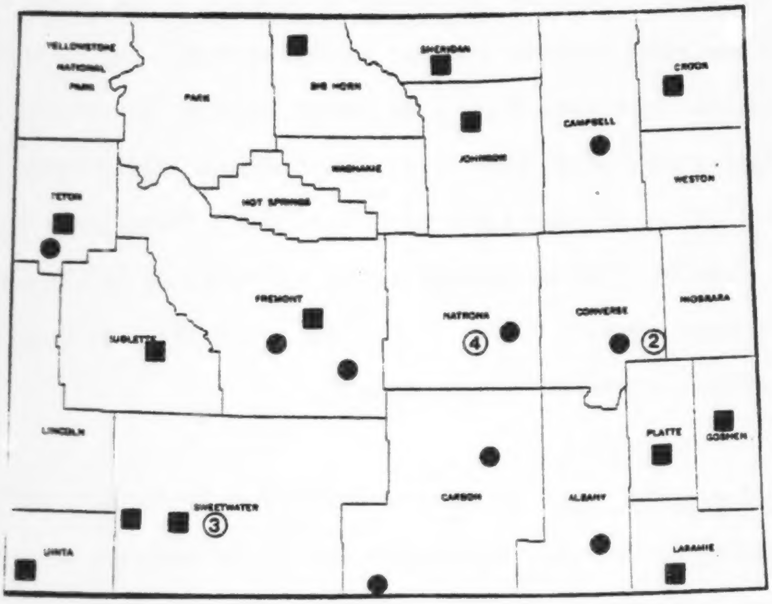
| County | TSP | $SO_2$ | $NO_2$ | CO | Ox | LEAD |
|---|---|---|---|---|---|---|
| Davis | ⇨ | ⇨ | ⇨ | ⊡⇧ | ⊡⇨ | |
| Emery | □ | □ | | | | □ |
| Garfield | | | | | | □ |
| Grand | □ | | | | | |
| Iron | | □ | | | | |
| Kane | | | | | | □ |
| Salt Lake | ➡ | ⊡⇨ | ⇧ | ⬆ | ⊡⇨ | |
| San Juan | | | | | | □ |
| Tooele | ⇨ | ⇨ | | | | |
| Uintah | □ | □ | ⇨ | | | |
| Utah | ➡ | | ⇩ | ➡ | ➡ | |
| Washington | | | | | | □ |
| Weber | ⇧ | | ⇧ | ⊡⇧ | □ | |

| | |
|---|---|
| □ | No evidence standard exceeded |
| ⊡ | Exceeds primary standard |
| ■ | Exceeds alert level |
| ⇧ | Improvement |
| ⇨ | No apparent trend |
| ⇩ | Deterioration |

## Wyoming Air Quality

The only current air pollution monitoring in the State of Wyoming is for total suspended particulates and sulfur dioxide. The nonattainment area for TSP in the Trona industrial area (about 28 miles WSW of the City of Rock Springs) showed no primary level violations in 1980. Three stations at Rock Springs had 18 primary level violations and 1 alert level violation for TSP in 1980. Lander (Fremont County) showed 3 primary daily TSP violations and a yearly mean standard violation in 1980. Five counties sampled for $SO_2$ with an average arithmetic mean of 3 $Mg/m^3$.

Trona Industrial Area - A nonattainment area for primary TSP violations was designated for an area 10-miles square at the location mentioned above. No primary level violations were shown for 1977 thru 1980 at the Granger station. An average of 56 days were sampled during each of these four years.


YELLOWSTONE NATIONAL PARK
PARK
BIG HORN
SHERIDAN
CROOK
CAMPBELL
JOHNSON
WASHAKIE
WESTON
TETON
HOT SPRINGS
FREMONT
NATRONA
④
CONVERSE
②
NIOBRARA
SUBLETTE
LINCOLN
SWEETWATER
③
CARBON
ALBANY
PLATTE
GOSHEN
UINTA
LARAMIE

WYOMING

MONITORING SITES

■ Stations with 75% or more of maximum possible data

● Stations with less than 75% of maximum possible data

# WYOMING

## STATIONS USED FOR TRENDS AND/OR STATUS

| County | City or Location | Station Number | TSP | $O_x$ |
|---|---|---|---|---|
| Albany | Laramie | 520400005F01 | X* | |
| Big Horn | Lovell | 520040001F01 | X* | |
| Campbell | Gillette | 520280002F01 | X* | |
| Carbon | Savery | 52010004F03 | X* | |
| | Hanna | 52010005F02 | X* | |
| Converse | Douglas | 520220002F02 | X* | |
| | Douglas | 520180006F03 | | X* |
| Crook | Devils Tower | 520200002F03 | X | |
| Fremont | Riverton | 520600001F01 | X | |
| Lander | | 520380001F01 | X* | |
| Goshen | Lingle | 520300003F03 | X | |
| Johnson | Southwest of Buffalo | 520360001F03 | X | |
| Laramie | Cheyenne | 520140001F01 | X | |
| Natrona | Casper | 520120003F01 | X* | |
| | Casper | 520120004F01 | X* | |
| Platte | Wheatland | 520830001F01 | X | |
| Sheridan | Sheridan | 520660002F03 | X | |
| Sublette | Boulder | 520680001F03 | X | |
| Sweetwater | Rock Springs | 520620001F01 | X | |
| | Rock Springs | 520620003F01 | X | |
| | Rock Springs | 520620004F01 | X* | |
| | Grander | 520680001F03 | X | |
| Teton | Kelly | 520720001F03 | X | |
| Uinta | Evanston | 520240001F01 | X | |

*Status Only

## WYOMING

## STATIONS NOT USED FOR STATUS AND/OR TRENDS - LESS THAN 75% OF MAXIMUM DAYS

| County | City or Location | Station Number | TSP |
|---|---|---|---|
| Fremont | Jefferson | 520260002FO2 | X |
| Natrona | Casper | 520120001F09 | X |
| Teton | Jackson | 520720002FO1 | X |

## AIR QUALITY TRENDS
## BASED ON STANDARD VIOLATIONS

## WYOMING

## NONATTAINMENT AREAS

| Nonattainment Area | Year | Arithmetic Mean a (ug/m$^3$) | Total Suspended Particulates |  |  |
|---|---|---|---|---|---|
|  |  |  | Days Sampled | Violation Days | No. of Stations |
| Trona Industrial Area | 1977 | 32 | 58 | P-0 | 1 |
|  | 1978 | 29 | 55 | P-0 | 1 |
|  | 1979 | 44 | 55 | P-0 | 1 |
|  | 1980 | 44 | 55 | P-0 | 1 |

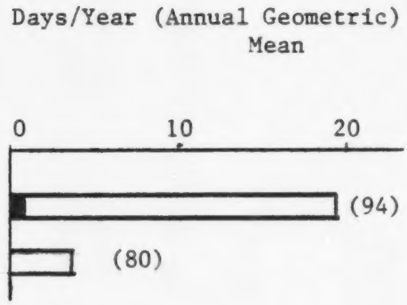
a/ Average of the Geometric or Arithmetic Means for all Stations
A = Alert Violation Days
P = Primary Standard Violation Days

# NUMBER OF DAYS THAT PRIMARY STANDARD OR ALERT LEVEL WAS EXCEEDED IN 1980

## WYOMING

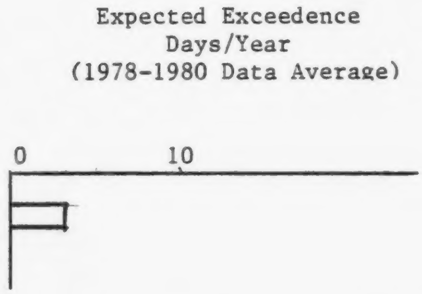
## TOTAL SUSPENDED PARTICULATES

| County (City or Location) | Days Sampled |
|---|---|
| Fremont (Lander) | 49 |
| Sweetwater (Rock Springs) | 62 |



## OZONE

| County (City or Location) | Days Sampled |
|---|---|
| Converse (Douglas) | 74 |



▭ Primary Level Exceeded

▬ Alert Level Exceeded

# STATUS AND TRENDS IN AIR QUALITY

## WYOMING

| County | TSP | OZONE | County | TSP | OZONE |
|---|---|---|---|---|---|
| Albany | □ | | Laramie | ⇨ | |
| Big Horn | ⇨ | | Natrona | □ | |
| Campbell | □ | | Platte | ⇨ | |
| Converse | □ | ▣ | Sheridan | ⇨ | |
| Crook | ⇨ | | Sublette | ⇨ | |
| Fremont | ⇨ | | Sweetwater | ➡ | |
| Goshen | ⇨ | | Teton | ⇨ | |
| Johnson | ⇨ | | Uinta | ⇨ | |

| | |
|---|---|
| □ | No evidence standard exceeded |
| ▣ | Exceeds primary standard |
| ■ | Exceeds alert level |
| ⇧ | Improvement |
| ⇨ | No apparent trend or insufficient data to determine trend |
| ⇩ | Deterioration |

# APPENDIX A

## National Ambient Air Quality Standards

# NATIONAL AMBIENT AIR QUALITY STANDARDS

| Pollutant | Time period/standard | Maximum permissible concentration |
|---|---|---|
| Suspended particulate matter | Annual, secondary | 60 μg/m$^3$ |
| (Total suspended particulates) | Annual, primary[a] | 75 μg/m$^3$ |
| (TSP) | 24-hour, secondary[b] | 150 μg/m$^3$[c] |
| | 24-hour, primary | 260 μg/m$^3$[c] |
| Sulfur dioxide | Annual, primary | 80 μg/m$^3$ |
| ($SO_2$) | 24-hour, primary | 365 μg/m$^3$[c] |
| | 3-hr, secondary | 1300 μg/m$^3$[c] |
| Carbon monoxide | 1-hr, primary | 40 mg/m$^3$[c] |
| (CO) | 8-hr, primary | 10 mg/m$^3$[c] |
| Oxidants/ozone | 1-hr, primary | 235 μg/m$^3$[c] |
| ($O_x + O_z$ or $O_3$) | | |
| Nitrogen dioxide | Annual, primary | 100 μg/m$^3$ |
| ($NO_2$) | | |
| Lead | Quarterly, primary | 1.5 μg/m$^3$ |

---

[a] Primary: to protect public health.

[b] Secondary: to protect public welfare.

[c] These values are not to be exceeded more than once per year.

# APPENDIX B

## Breakpoints For Pollutant Standards Index

(Includes Alert Level For Each Pollutant)

## Breakpoints for PSI ( ) in Metric Units

| Breakpoints | PSI Value ( ) | TSP ug/m$^3$ 24-hr. | SO$_2$ ug/m$^3$ 24-hr. | TSPxSO$_2$ (ug/m$^3$)$^2$ | CO mg/m$^3$ 8 hours | O$_3$ ug/m$^3$ 1-hr. | NO$_2$ ug/m$^3$ 1-hr. |
|---|---|---|---|---|---|---|---|
| 50% of primary short-term NAAQS | 50 | 75[a] | 80[a] | b | 5.0 | 118 | b |
| Primary short-term NAAQS | 100 | 260 | 365 | b | 10.0 | 235 | b |
| Alert Level | 200 | 375 | 800 | $65 \times 10^3$ | 17.0 | 400 | 1130 |
| Warning Level | 300 | 625 | 1600 | $261 \times 10^3$ | 34.0 | 800 | 2260 |
| Emergency Level | 400 | 875 | 2100 | $393 \times 10^3$ | 46.0 | 1000 | 3000 |
| Significant Harm Level | 500 | 1000 | 2620 | $490 \times 10^3$ | 57.5 | 1200 | 3750 |

[a] Annual primary NAAQS.

[b] No index value reported at concentration levels below those specified by the Alert Level Criteria.

# APPENDIX C

## Procedures Used To Determine Status

## PROCEDURES USED TO DETERMINE STATUS

## TOTAL SUSPENDED PARTICULATES

### County Status

1. Select worst site in each county based on:
    - -- Number of days per year with a concentration of greater than 260 ug/m$^3$
    - -- Data available in 1980 (must have greater than 75% of maximum possible data)
    - -- Population exposure of site. Should be representative populated area
2. For the selected site the number of days with a concentration value greater than 260 ug/m$^3$ for 1980
3. For same site, number of days with a concentration value greater than 375 ug/m$^3$ for 1980

### Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
    - -- Any site with a daily concentration value greater than 260 ug/m$^3$ in the county
    - -- Any site with a daily concentration value greater than 375 ug/m$^3$ in the county
    - -- Compare violation days at all sites to total days sampled at all sites for the year

# NITROGEN DIOXIDE

## County Status

1. Select worst site in each county based on:
   - Highest annual average
   - Data available in 1980
2. Determine whether annual average concentration is greater than 100 $ug/m^3$
   - Actual data are used
   - Years without valid annual average are disregarded

## Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
   - Any site with an annual average concentration greater than 100 $ug/m^3$
2. Compare the sites with yearly average concentration values of 100 $ug/m^3$

   to the total number of sites sampled for the year

## SULFUR DIOXIDE

### County Status

1. Select site in each county based on:
   - Population exposure. Must be in area where people are present
   - Representativeness within county
   - Number of days for 1980 greater than 24-hour average concentration of 365 ug/m$^3$
   - Data available in 1980
2. For the selected site, number of days in 1980 greater than primary 24-hour standard for the year
   - Actual data used
   - Continuous data preferred over noncontinuous
3. For same site count number of days per year with at least one concentration value greater than 730 ug/m$^3$
   - Actual data used

### Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
   - Any site with a 24-hour concentration greater than 365 ug/m$^3$ in the county
   - Any site with a 24-hour concentration greater than 730 ug/m$^3$ in the county
2. Compare violation days at all sites to the total days sampled at all sites for the year

# OZONE

## County Status

1. Select worst site in county based on:
   - -- Number of days with a 1-hour concentration greater than 235 ug/m$^3$
   - -- Data available for at least one year (1978-1980) during the months April through September
2. For selected site, count the number of days per year 1978-1980, with at least one hourly concentration value greater than 235 ug/m$^3$
   - -- For periods with no data, estimate by examining data from nearby sites and for the same site during same period of other years
   - -- Data are insufficient if unavailable during the peak ozone season (April-September)
3. For same site, count number of days with at least 1-hour concentration value greater than 400 ug/m$^3$
   - -- Actual number is always used

## Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
   - -- Any site with a day having a 1-hour concentration of greater than 235 ug/m$^3$
   - -- Any site with a day having 1-hour concentration of greater than 400 ug/m$^3$
2. Compare violation days at all sites to total days sampled at all sites for the year

# CARBON MONOXIDE

## County Status

1. Select worst site in each county based on:
   - -- Number of days greater than 10 $mg/m^3$ 8-hour average concentration
   - -- Data available for 1980
2. For selected site, count the number of days in 1980 with at leat one 8-hour average concentration greater than 10 $mg/m^3$
   - -- For periods with no data estimate by examining data for same site for same period of other years and by looking at data for other nearby sites
3. For same site count number of days with at least one 8-hour average concentration value greater than 17 $mg/m^3$
   - -- Actual number always used

## Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
   - -- Any site with a day having an 8-hour concentration greater than 10 $mg/m^3$
   - -- Any site with a day having an 8-hour concentration greater than 17 $mg/m^3$
2. Compare violation days at all sites to total days sampled at all sites for the year

# LEAD

## County Status

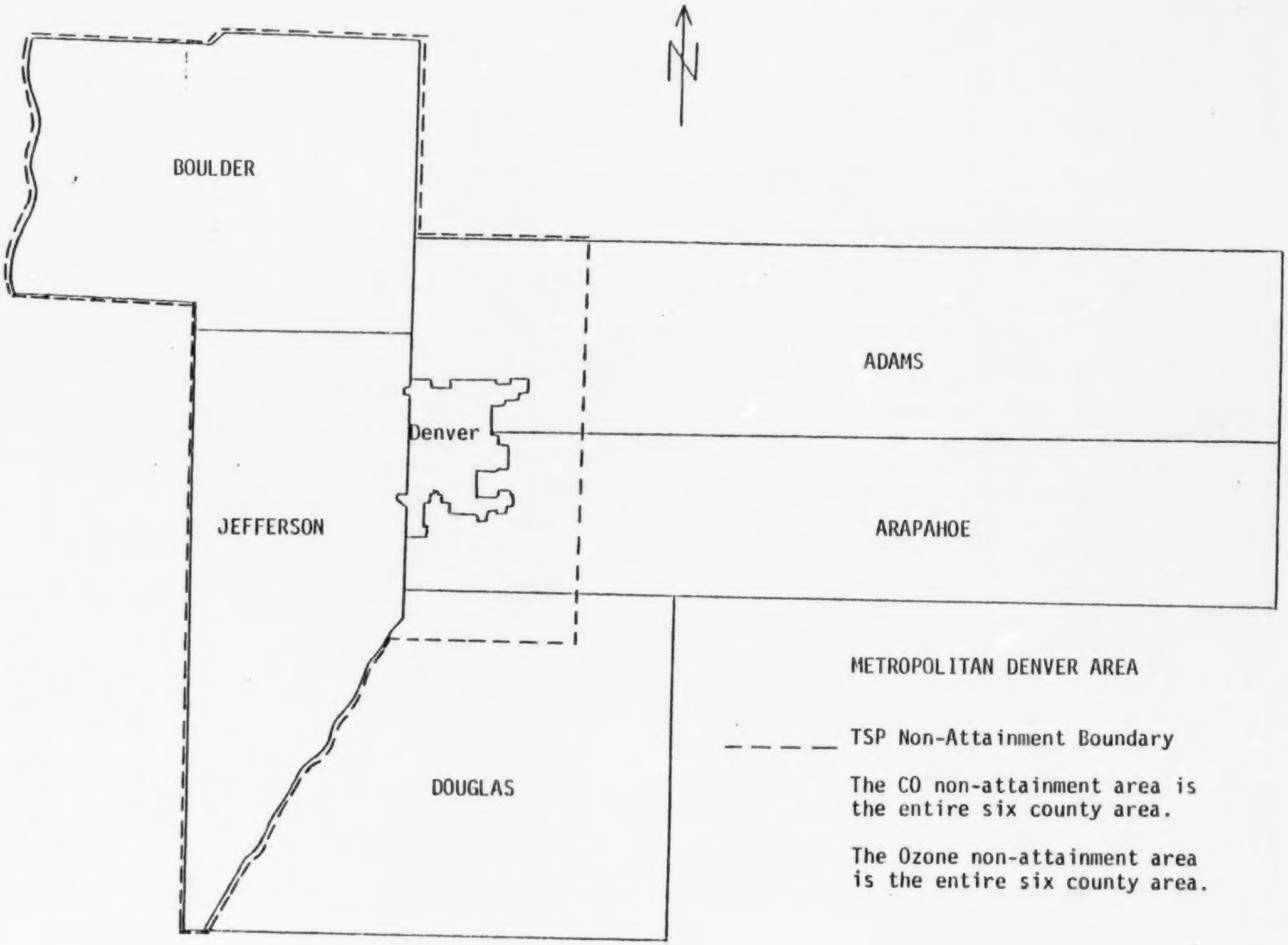
1. Select the worst site in each county based on:
    - -- Quarterly average concentration periods greater than 1.5 $ug/m^3$
    - -- Data available in 1980
2. For selected site, count number of quarters in 1980 with quarterly concentration value greater than 1.5 $ug/m^3$

## Nonattainment Area Status

1. Select all the sites in each nonattainment area based on:
    - -- Any site with a quarterly average concentration greater than 1.5 $ug/m^3$
2. Compare violation quarters at all sites to total quarters sampled at all sites for the year

# APPENDIX D

## Nonattainment Area Maps

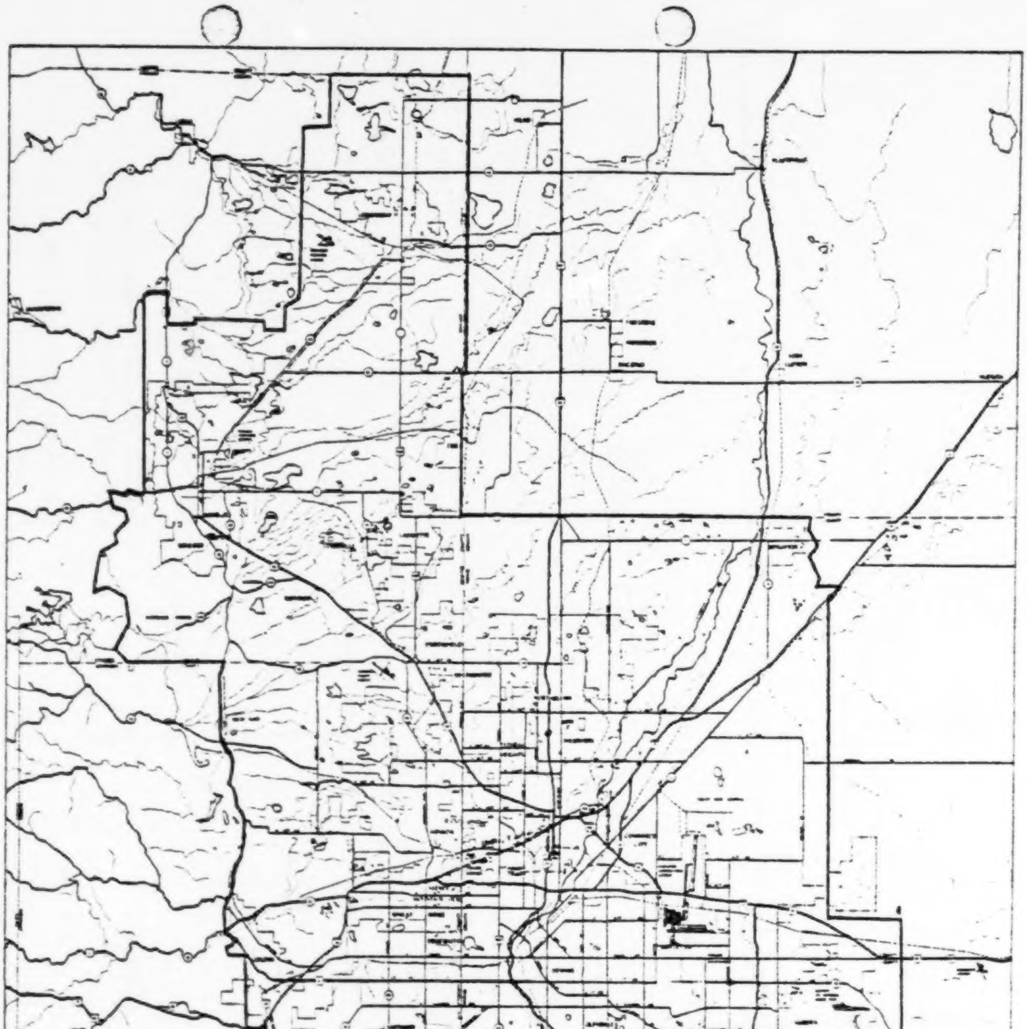

BOULDER
JEFFERSON
Denver
ADAMS
ARAPAHOE
DOUGLAS
N

METROPOLITAN DENVER AREA

- - - - TSP Non-Attainment Boundary

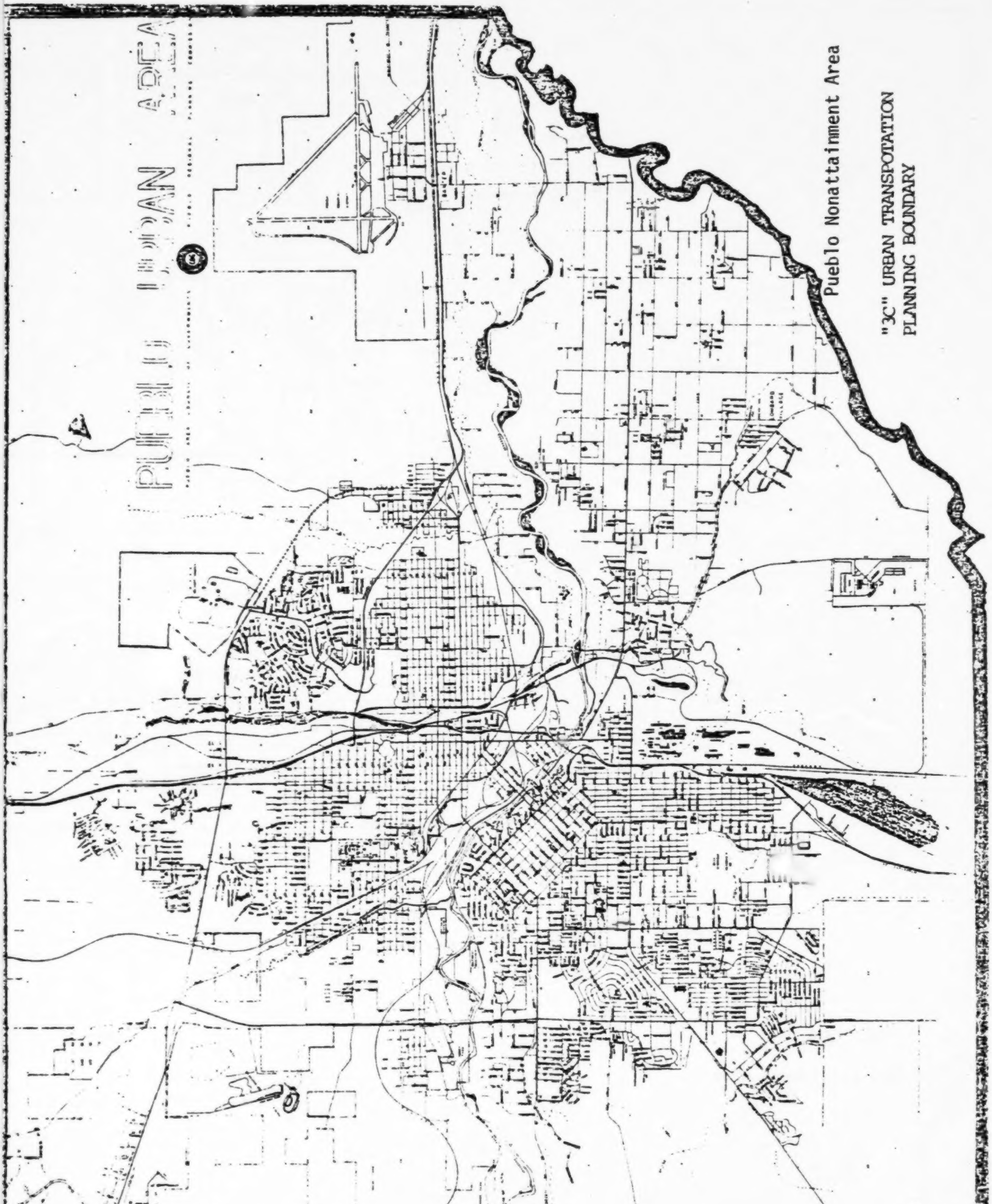
The CO non-attainment area is the entire six county area.

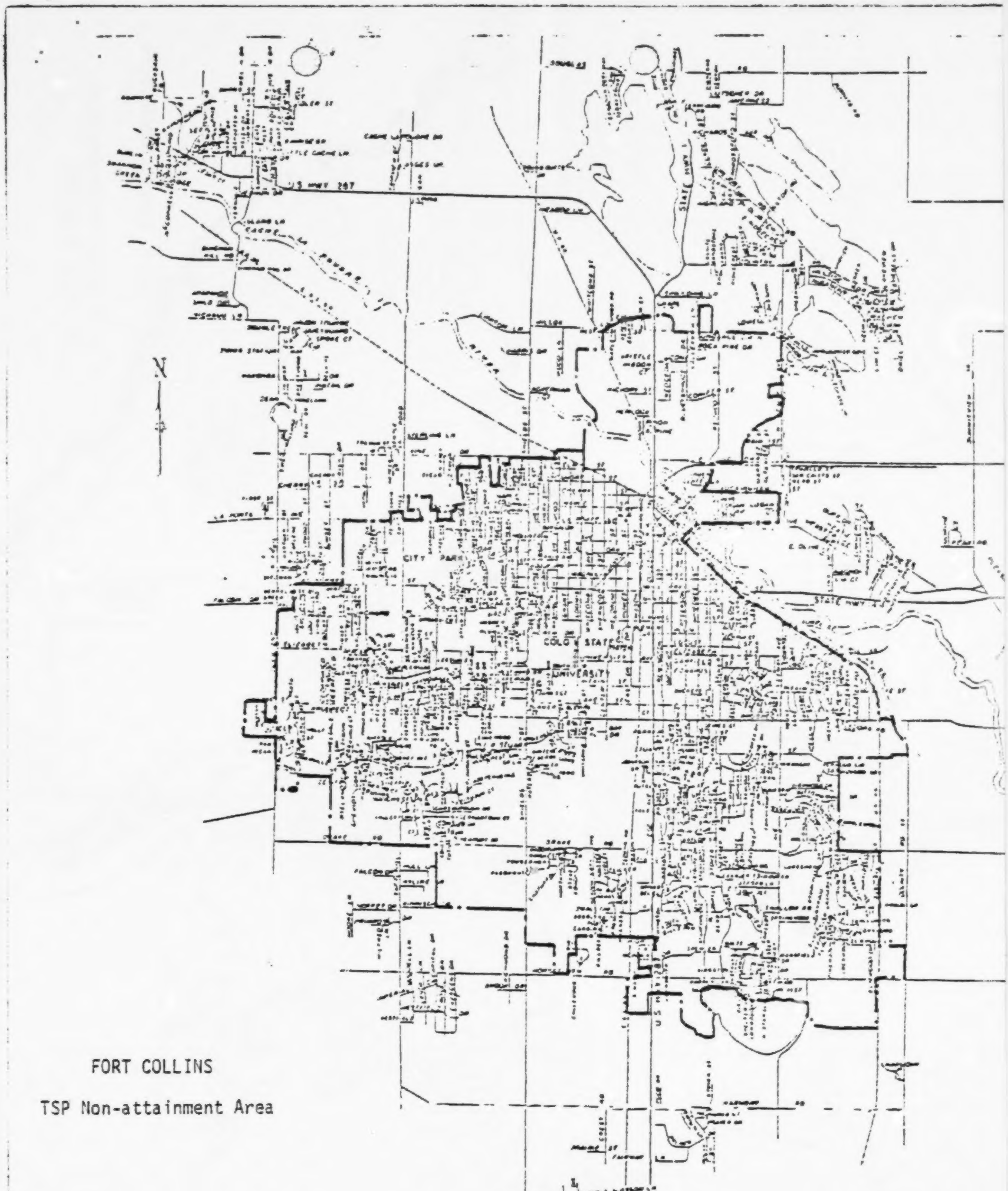
The Ozone non-attainment area is the entire six county area.


AUGUST 1979
DRCOG

DENVER 3-C
TRANSPORTATION PLANNING AREA

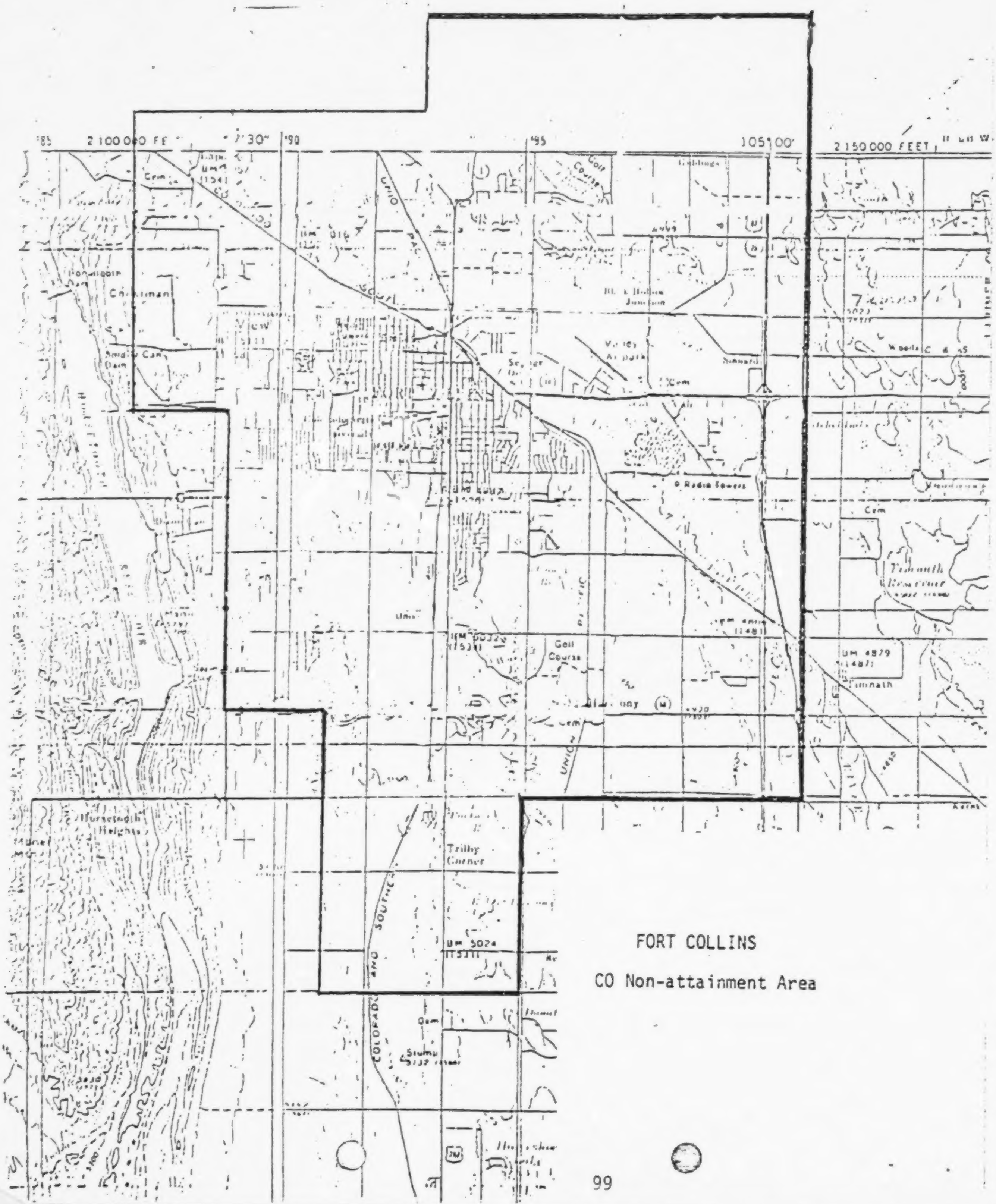
$NO_2$ Non-attainment Area


PUEBLO URBAN AREA
Pueblo Nonattainment Area
"3C" URBAN TRANSPOTATION
PLANNING BOUNDARY


N
US HWY 287
CITY PARK
COLO STATE
UNIVERSITY
STATE HWY 14
US 287

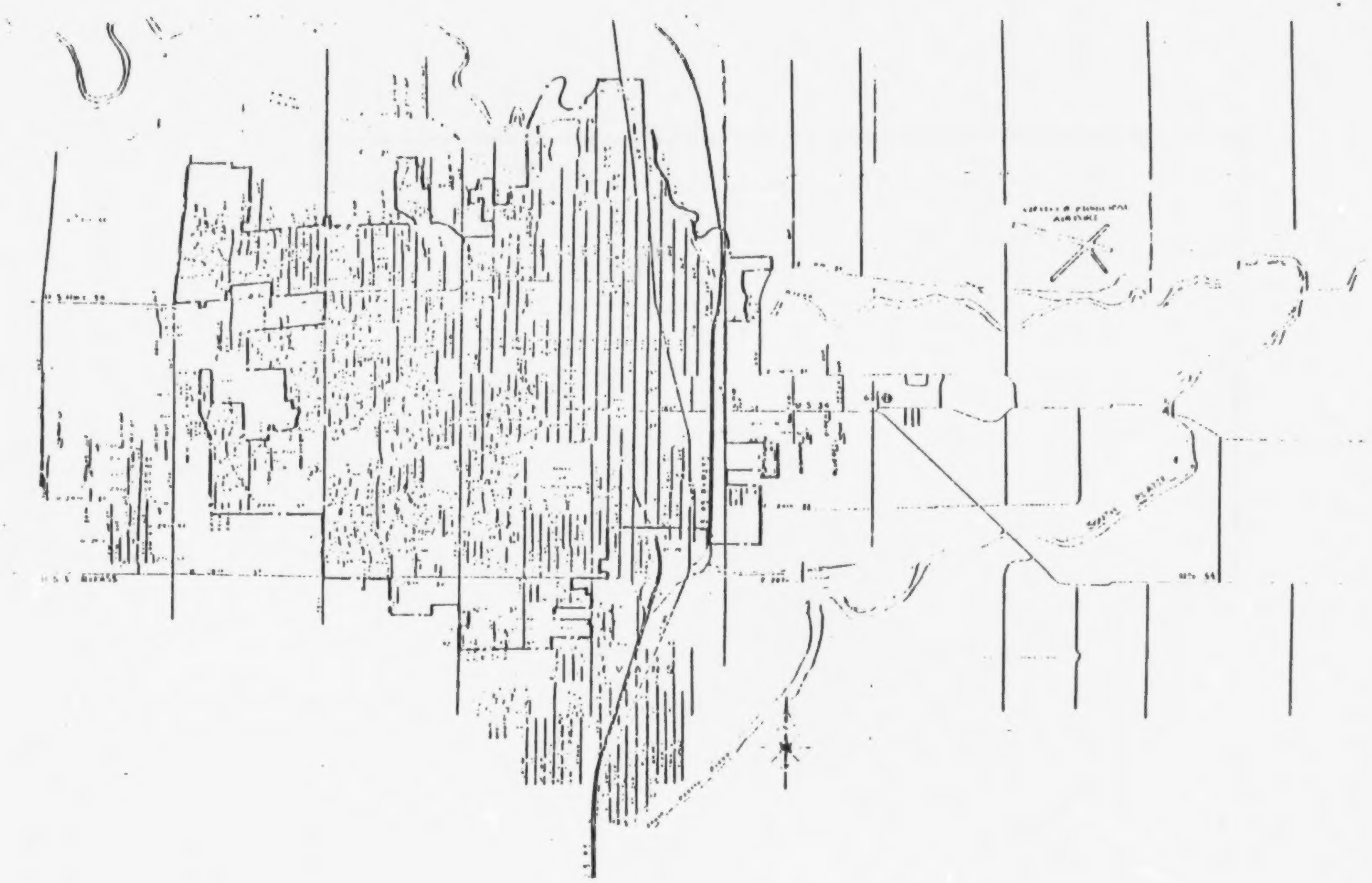
FORT COLLINS

TSP Non-attainment Area


2 100 000 FEET
7'30"
105°00'
2 150 000 FEET
Christman
Valley Airpark
Radio Towers
Timnath
Timnath Reservoir
Golf Course
Horsetooth Heights
Trilby Corner
UNION PACIFIC
COLORADO AND SOUTHERN
BM 4979
BM 5024
Cem

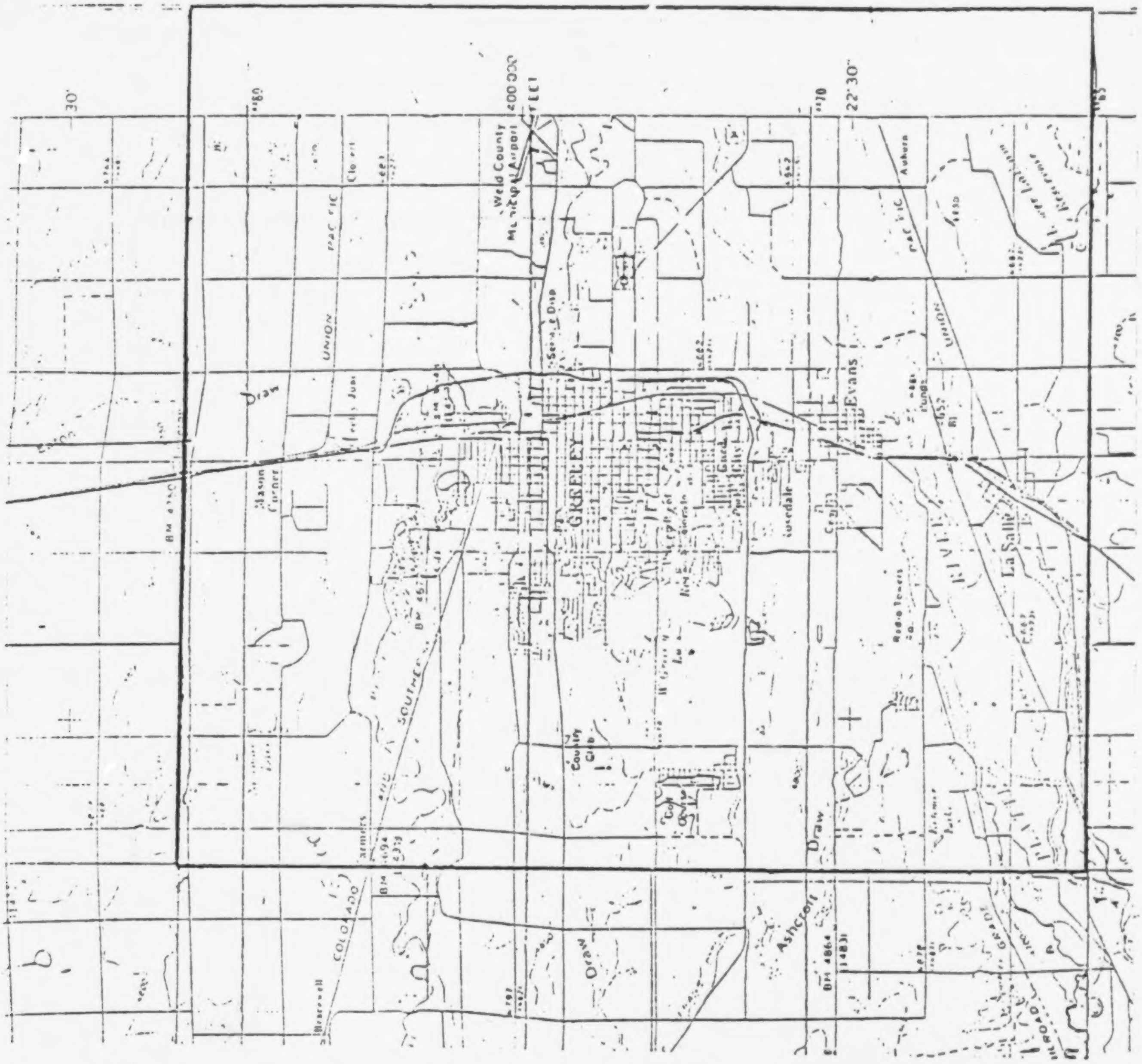
FORT COLLINS

CO Non-attainment Area



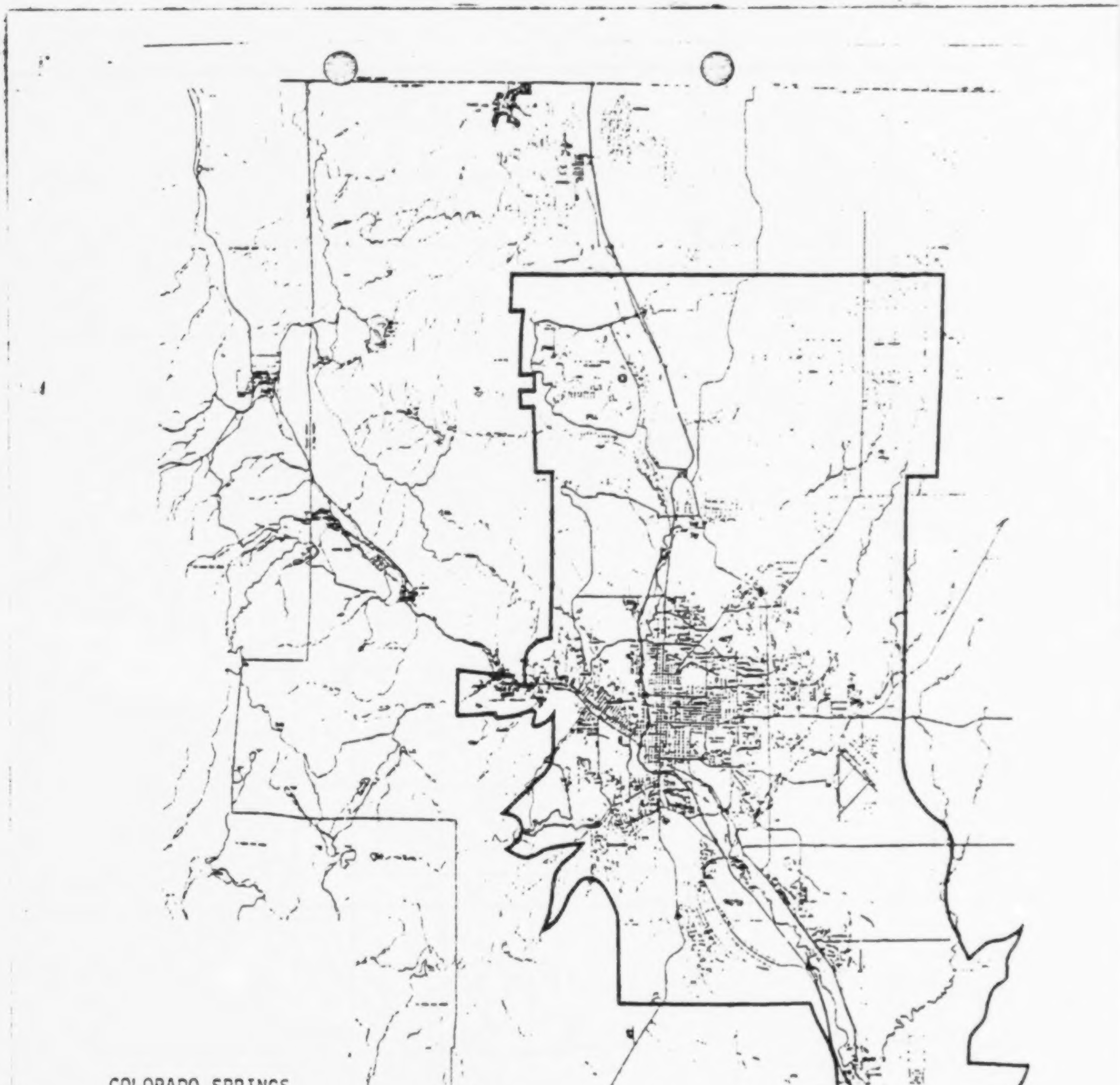
GREELEY

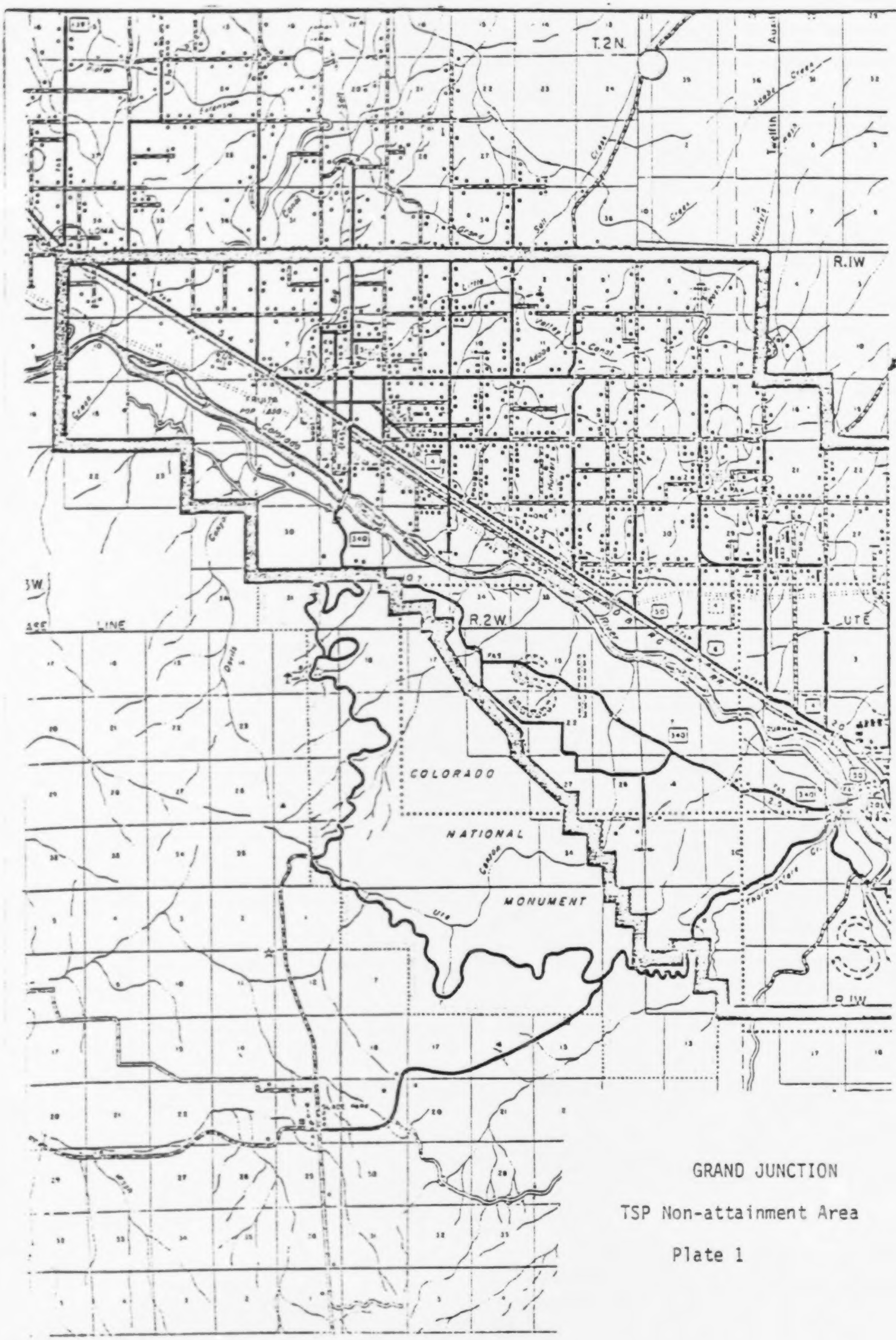
TSP Non-attainment Area


30'
22'30"
Weld County Municipal Airport
GREELEY
Evans
La Salle
Rosedale
Garden City
Mason Corner
Farmers
Draw
Ashcroft
UNION PACIFIC
COLORADO AND SOUTHERN
RIVER
County Club
BM 4864

GREELEY

CO Non-attainment Area


COLORADO SPRINGS
CO and TSP
Non-attainment Area

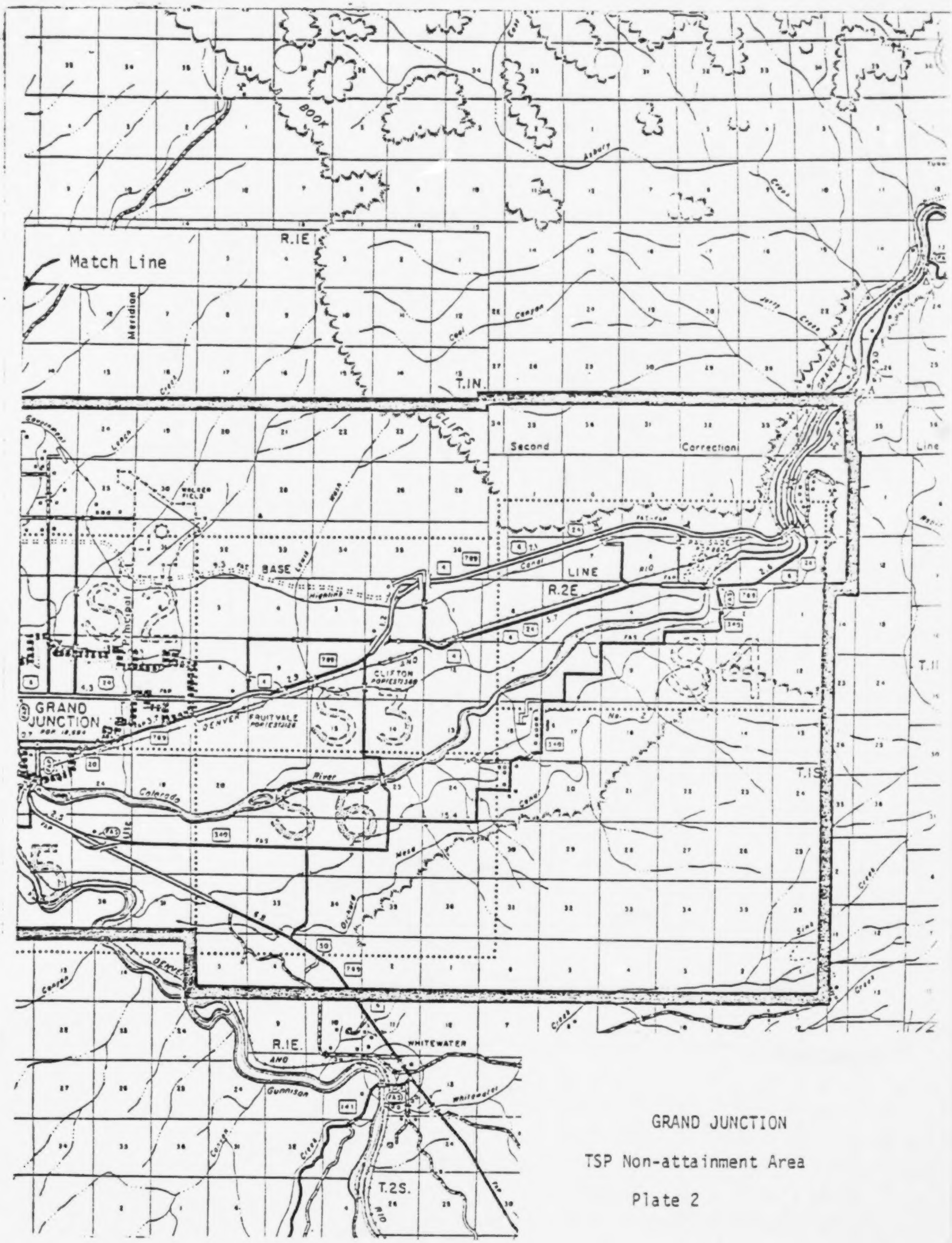

T.2N.
R.1W
3W
LINE
R.2W.
UTE
LOMA
FRUITA
Colorado
Grand
Salt
Creek
Adobe
COLORADO
NATIONAL
MONUMENT
Ute
340
50
6
R.1W

Match Line

GRAND JUNCTION

TSP Non-attainment Area

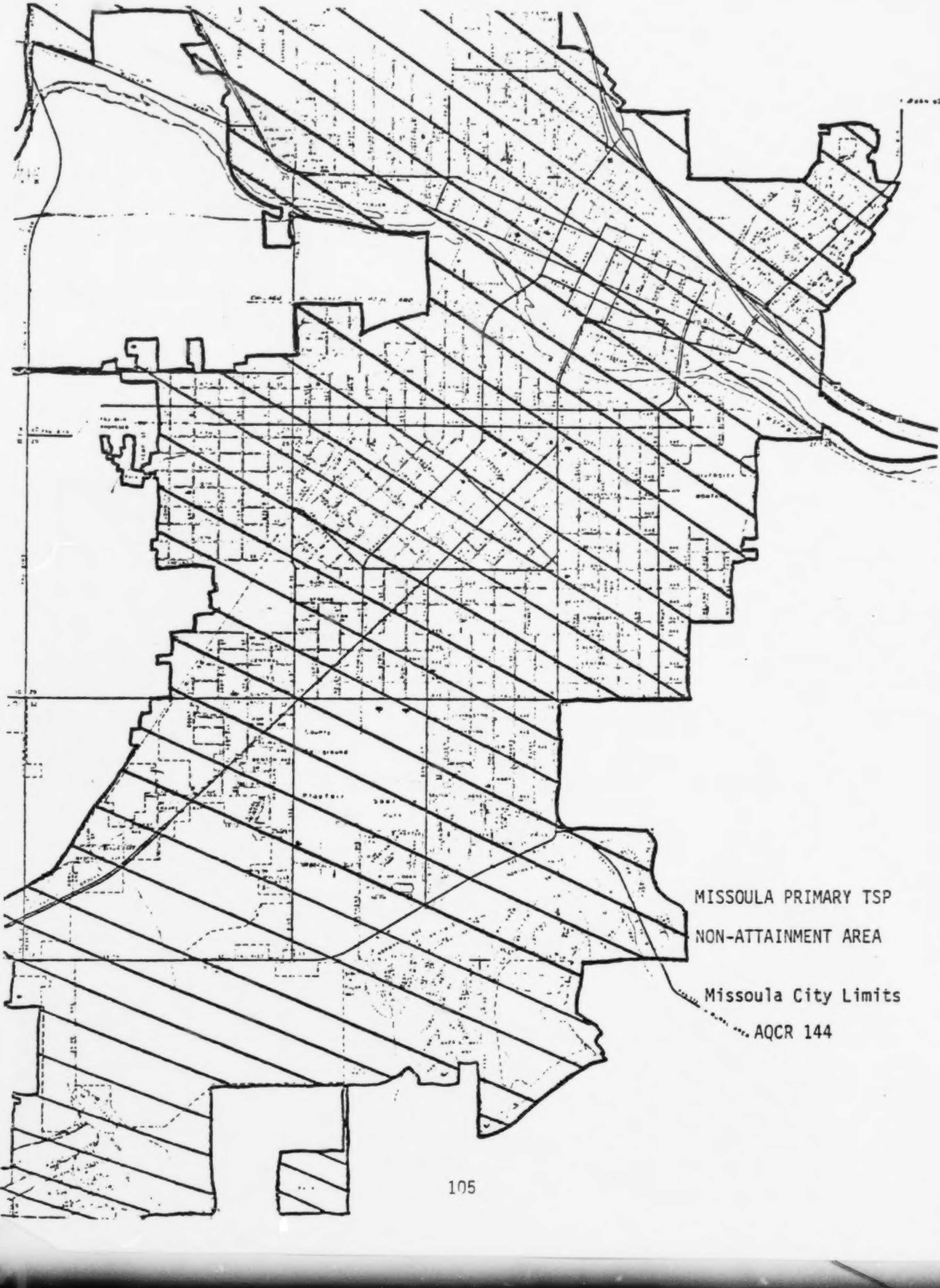
Plate 1

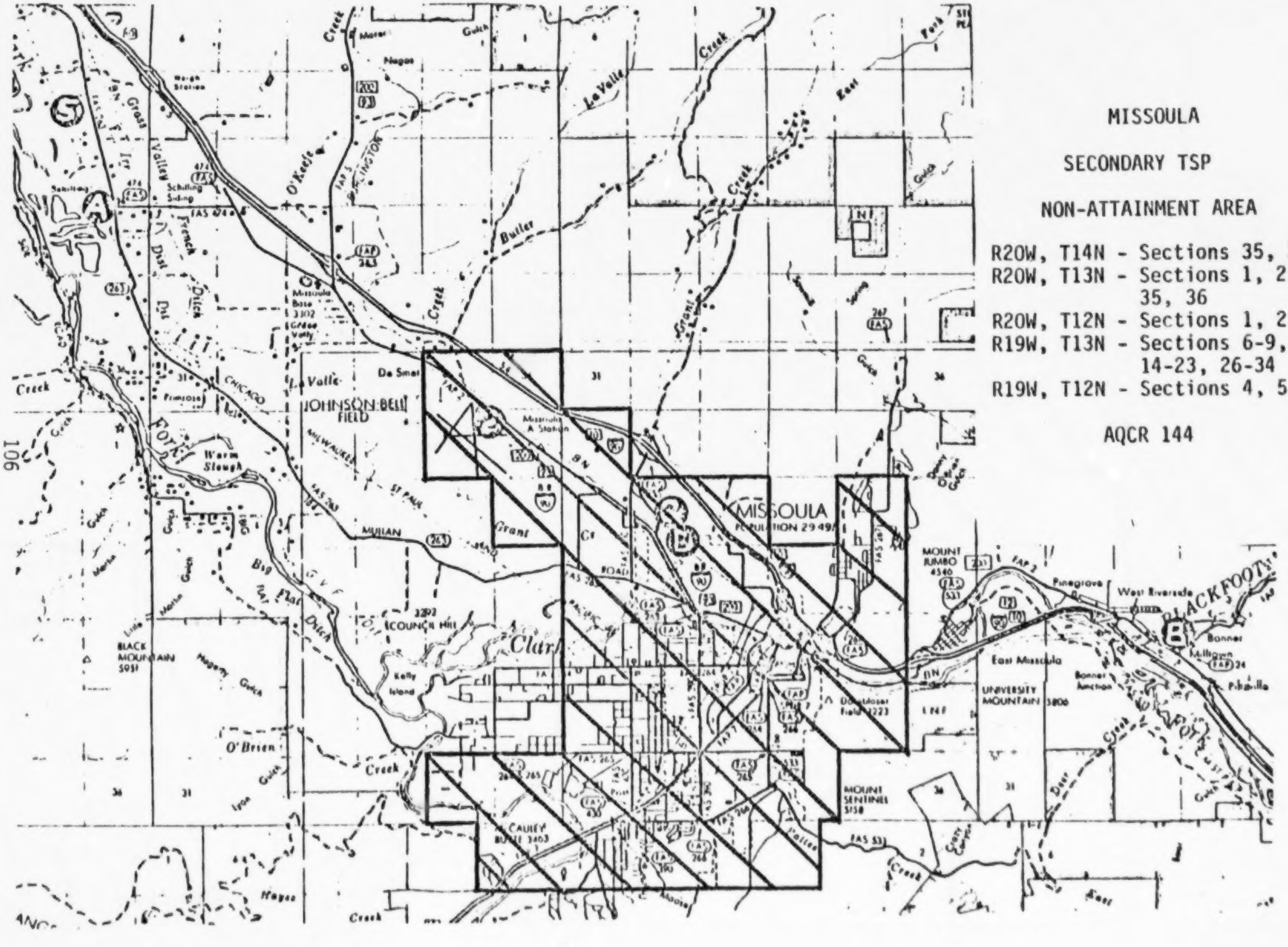

Match Line
R.1E
T.1N.
BOOK
CLIFFS
Asbury
Coal Canyon
Jerry Creek
GRANDE
Second
Correction
Line
Principal
Meridian
BASE
LINE
R.2E
Highline
Canal
RIO
PALISADE
CLIFTON
GRAND
JUNCTION
DENVER
FRUITVALE
Colorado
River
No. 2
Mesa
Orchard
Ute
T.1S
T.1I
Sink Creek
R.1E.
AND
WHITEWATER
Gunnison
Whitewater
T.2S.
RIO

GRAND JUNCTION

TSP Non-attainment Area

Plate 2


MISSOULA PRIMARY TSP
NON-ATTAINMENT AREA
Missoula City Limits
AQCR 144


MISSOULA
POPULATION 29 497
JOHNSON-BELL FIELD
De Smet
La Valle
Grass Valley
French Ditch
Butler Creek
Grant Creek
O'Keefe Creek
La Valle Creek
Rattlesnake Creek
Warm Slough
Big Flat Ditch
Clark Fork
COUNCIL HILL
Kelly Island
O'Brien Creek
BLACK MOUNTAIN 5051
MOUNT JUMBO 4540
MOUNT SENTINEL 5158
UNIVERSITY MOUNTAIN 5806
CAUEY BUTTE 3463
Pinegrove
West Riverside
East Missoula
Bonner
Milltown
Piltzville
Bonner Junction
BLACKFOOT
MULLAN
CHICAGO MILWAUKEE ST PAUL
BN
Primrose
Schilling Siding
Missoula A Station
Pattee Canyon

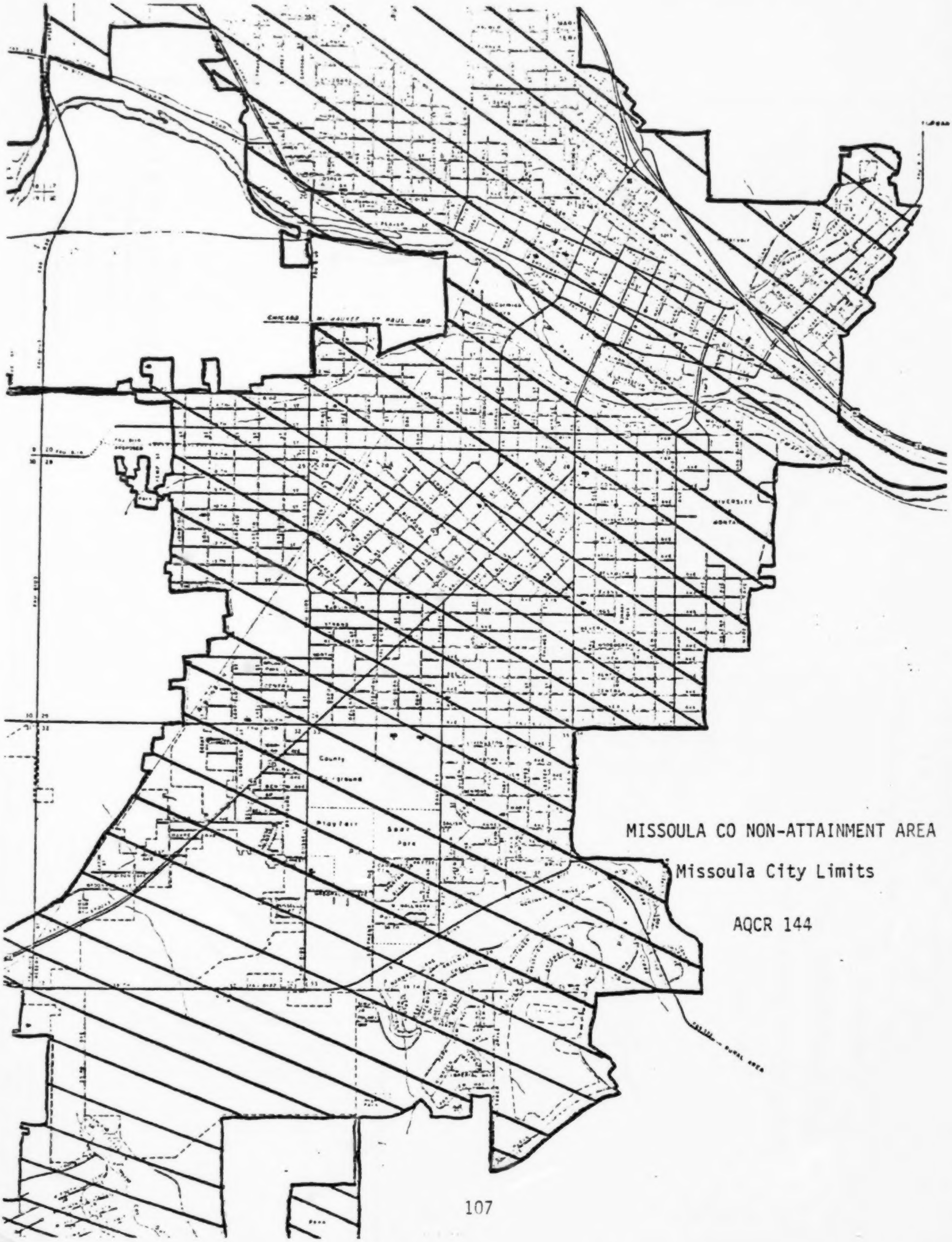
## MISSOULA

## SECONDARY TSP

## NON-ATTAINMENT AREA

R20W, T14N - Sections 35, 36
R20W, T13N - Sections 1, 2, 12,
35, 36
R20W, T12N - Sections 1, 2
R19W, T13N - Sections 6-9, 11,
14-23, 26-34
R19W, T12N - Sections 4, 5, 6

AQCR 144



MISSOULA CO NON-ATTAINMENT AREA

Missoula City Limits

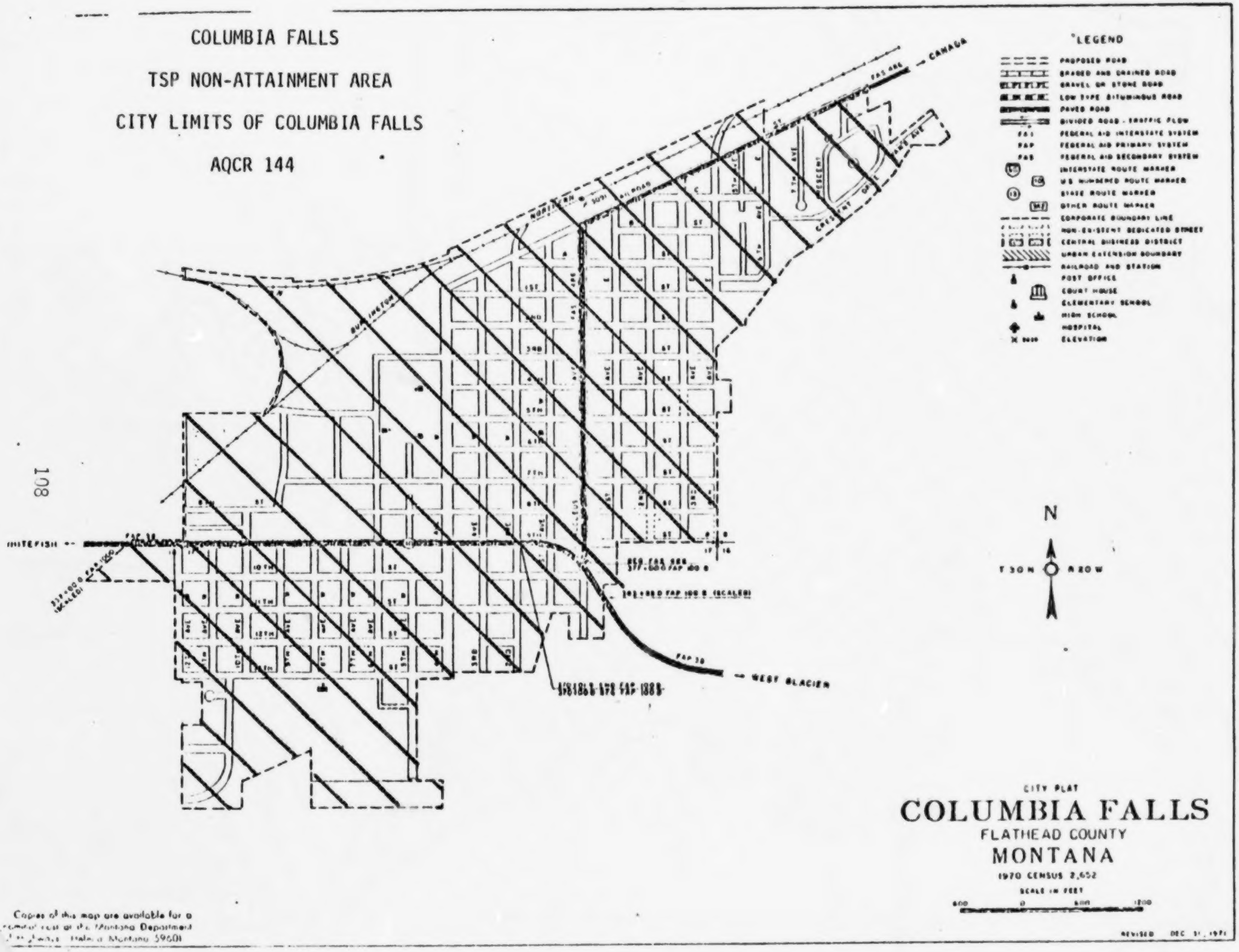
AQCR 144

COLUMBIA FALLS

TSP NON-ATTAINMENT AREA

CITY LIMITS OF COLUMBIA FALLS

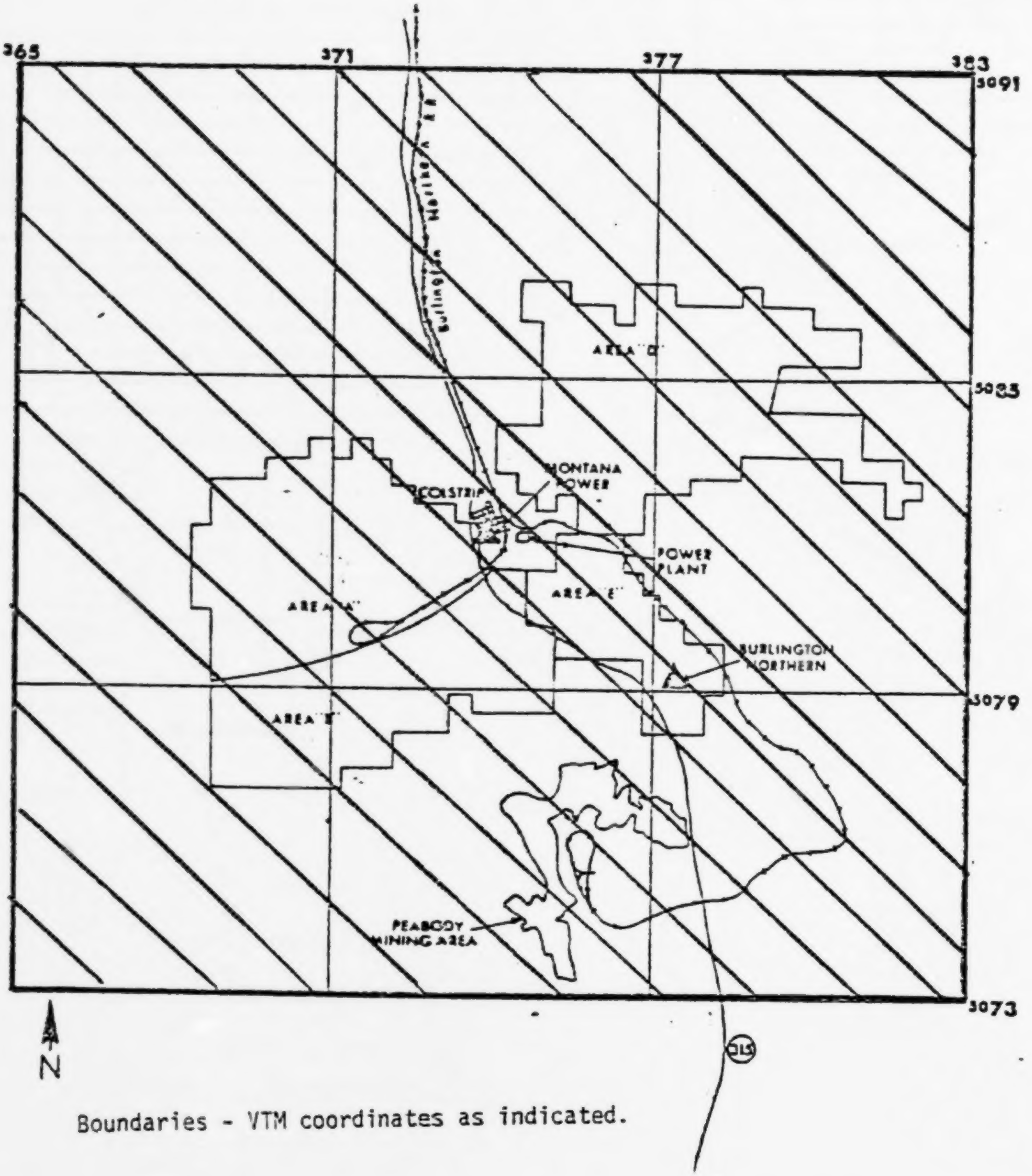
AQCR 144


LEGEND
PROPOSED ROAD
GRADED AND DRAINED ROAD
GRAVEL OR STONE ROAD
LOW TYPE BITUMINOUS ROAD
PAVED ROAD
DIVIDED ROAD - TRAFFIC FLOW
FAI FEDERAL AID INTERSTATE SYSTEM
FAP FEDERAL AID PRIMARY SYSTEM
FAS FEDERAL AID SECONDARY SYSTEM
INTERSTATE ROUTE MARKER
U S NUMBERED ROUTE MARKER
STATE ROUTE MARKER
OTHER ROUTE MARKER
CORPORATE BOUNDARY LINE
NON-EXISTENT DEDICATED STREET
CENTRAL BUSINESS DISTRICT
URBAN EXTENSION BOUNDARY
RAILROAD AND STATION
POST OFFICE
COURT HOUSE
ELEMENTARY SCHOOL
HIGH SCHOOL
HOSPITAL
ELEVATION
CANADA
WEST GLACIER
WHITEFISH
BURLINGTON NORTHERN RAILROAD
N
T 30 N
R 20 W
CITY PLAT
COLUMBIA FALLS
FLATHEAD COUNTY
MONTANA
1970 CENSUS 2,652
SCALE IN FEET
600 0 600 1200
REVISED DEC 31, 1971
Copies of this map are available for a nominal cost at the Montana Department of Highways, Helena, Montana 59601

## COLSTRIP

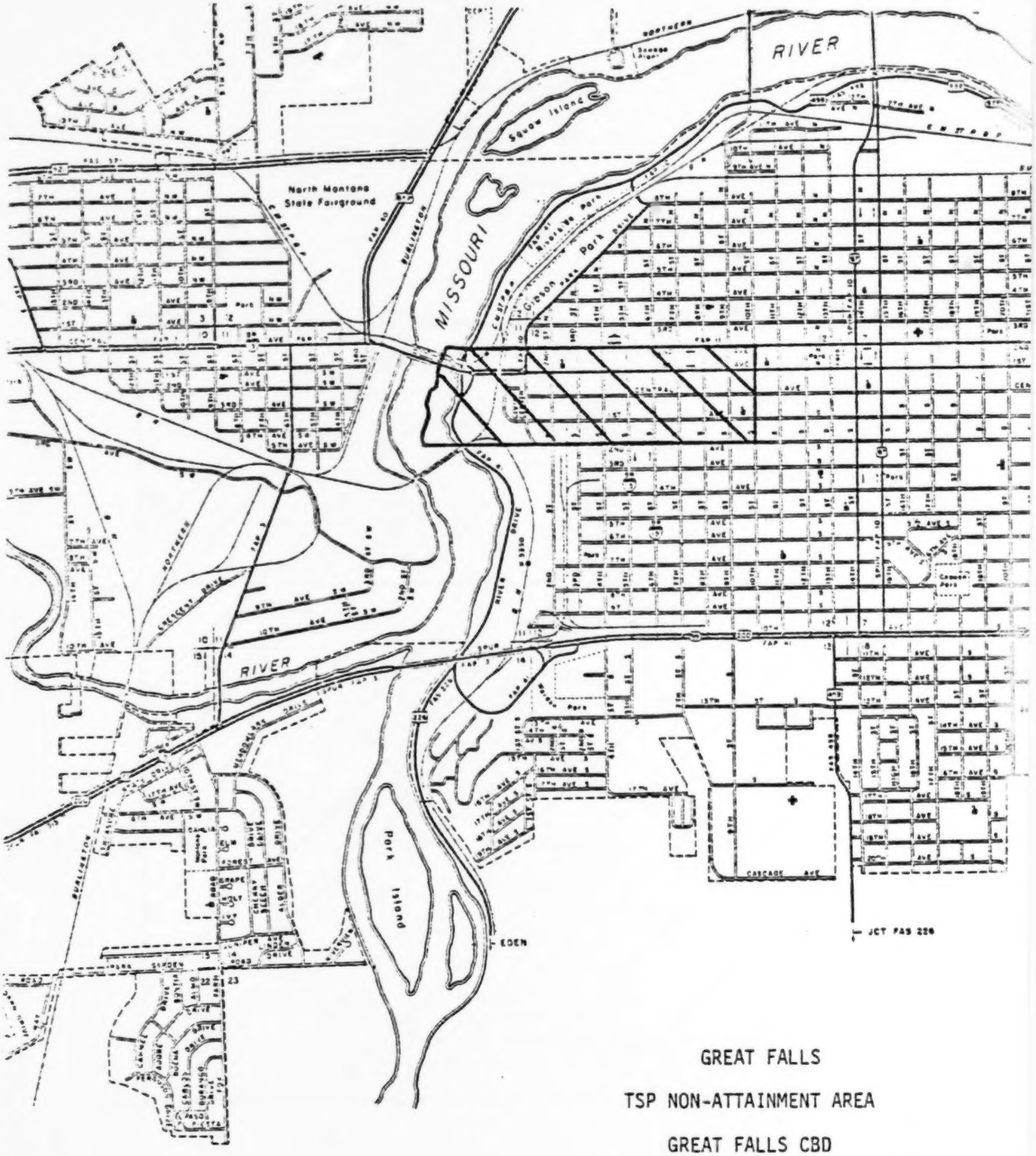
## TSP NON-ATTAINMENT AREA

## AQCR 143



365
371
377
383
5091
5085
5079
5073
Burlington Northern RR
AREA "D"
MONTANA POWER
COLSTRIP
POWER PLANT
AREA "A"
AREA "E"
BURLINGTON NORTHERN
AREA "B"
PEABODY MINING AREA
315
N

Boundaries - VTM coordinates as indicated.



RIVER
North Montana State Fairground
Squaw Island
MISSOURI
Gibson Park
Park Drive
RIVER
Park Island
EDEN
JCT FAS 226
CASCADE AVE
BURLINGTON
NORTHERN
CRESCENT DRIVE
CENTRAL

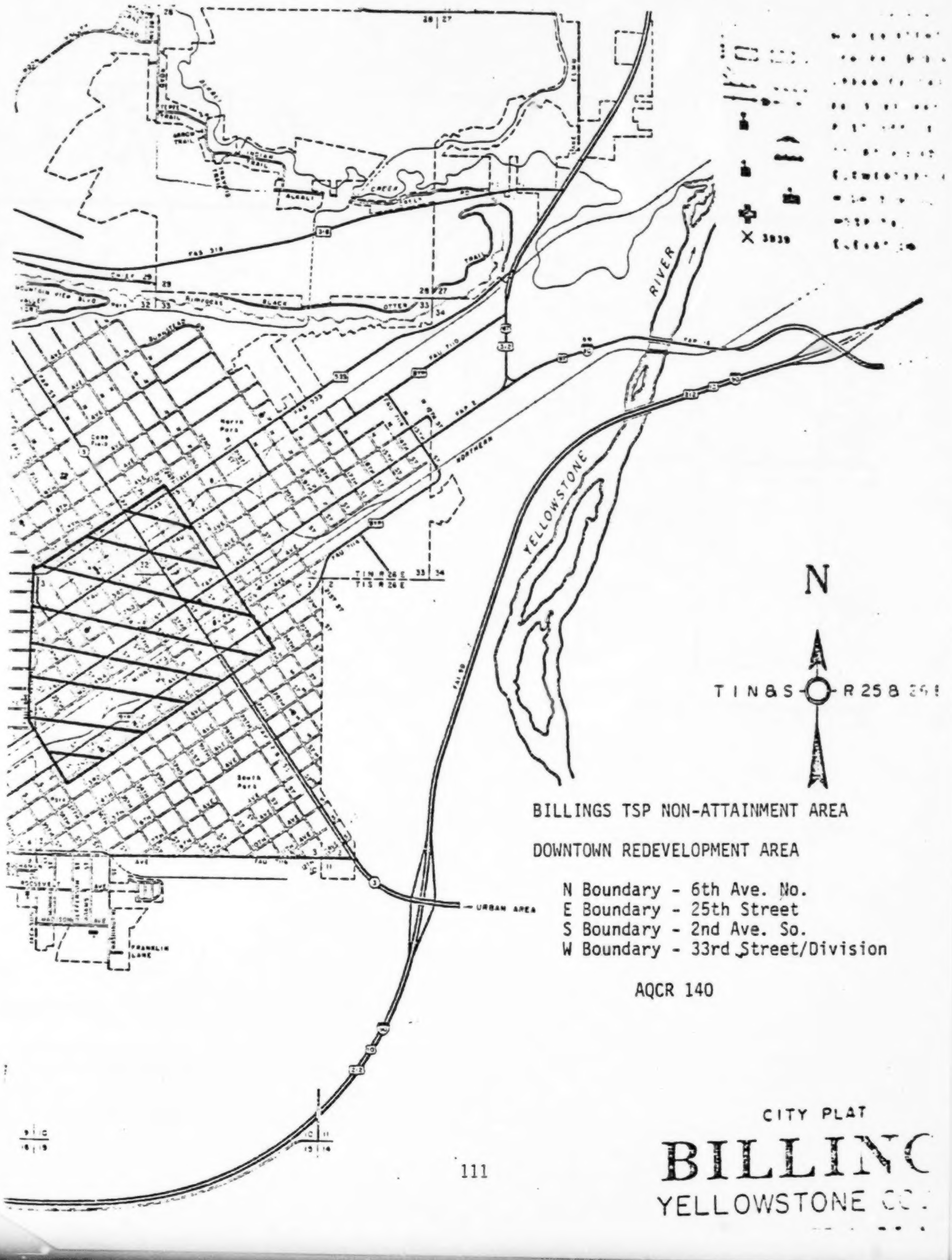
GREAT FALLS

TSP NON-ATTAINMENT AREA

GREAT FALLS CBD

| | |
|---|---|
| North Boundary | 2nd Ave. N. |
| East Boundary | 10th Street |
| South Boundary | 2nd Ave. S. |
| West Boundary | Missouri River |

AQCR 141

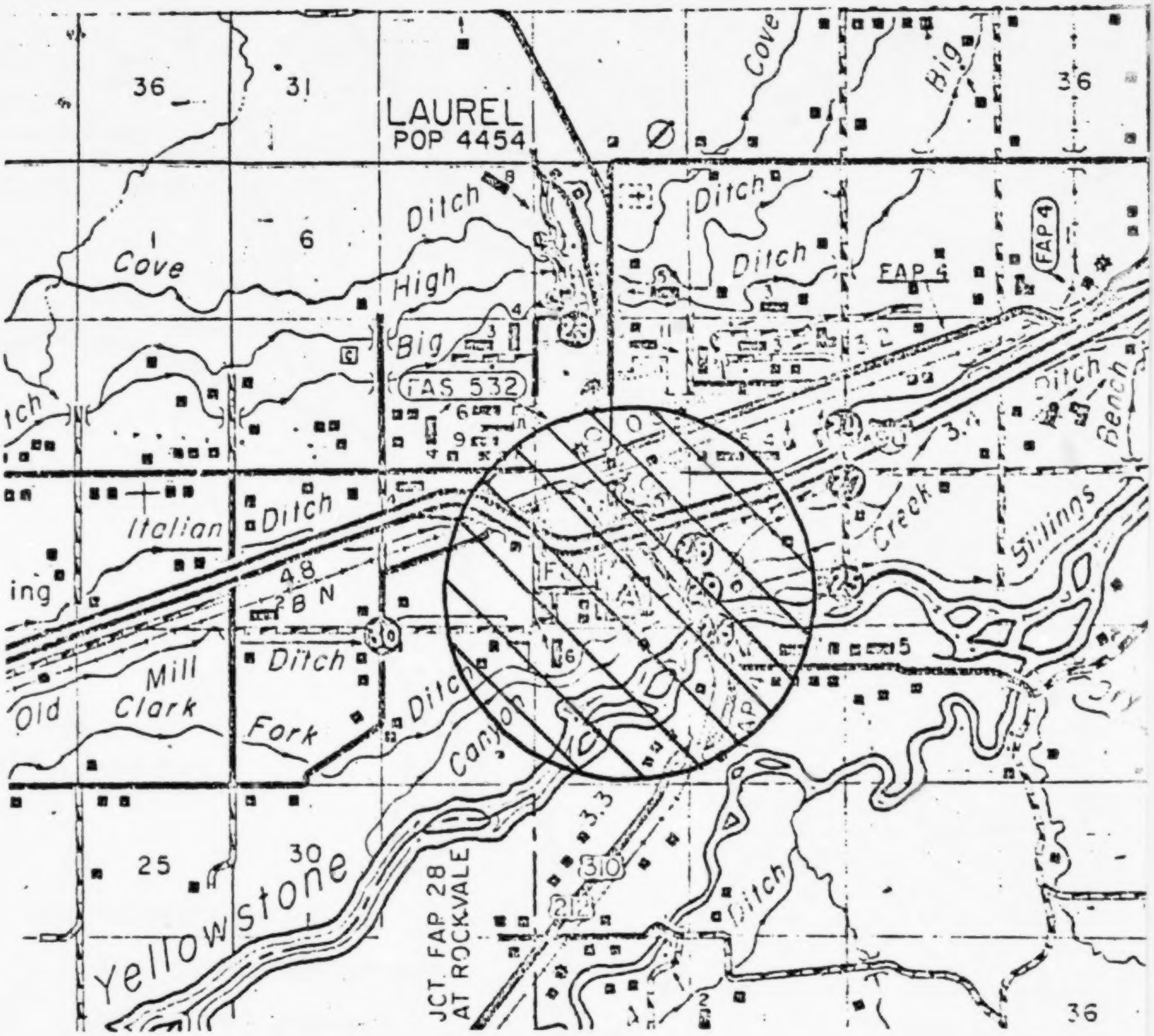

YELLOWSTONE
RIVER
N
T1N&S R25&26E
URBAN AREA
X 3939
CITY PLAT
BILLINC
YELLOWSTONE CO.

BILLINGS TSP NON-ATTAINMENT AREA

DOWNTOWN REDEVELOPMENT AREA

N Boundary - 6th Ave. No.
E Boundary - 25th Street
S Boundary - 2nd Ave. So.
W Boundary - 33rd Street/Division

AQCR 140

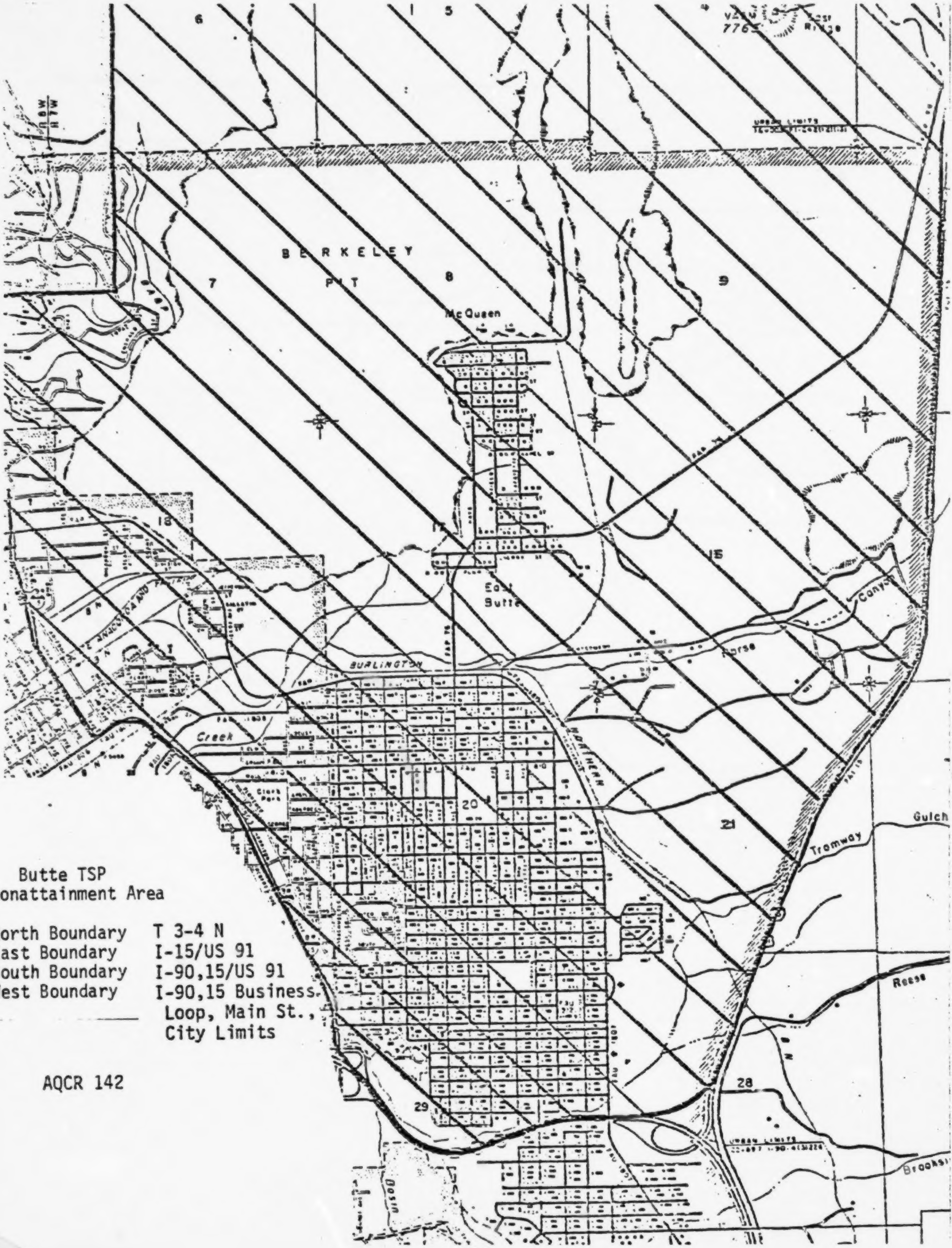

36
31
LAUREL
POP 4454
Cove
Big
36
Cove
Ditch
6
High
Big
FAS 532
Ditch
Ditch
FAP 4
3.2
Ditch
Bench
3.4
Creek
Billings
Italian
Ditch
4.8
2B N
Ditch
Mill
Old
Clark
Fork
Ditch
Canyon
5
3.3
310
212
Ditch
25
30
Yellowstone
JCT. FAP 28
AT ROCKVALE
2
36

LAUREL

$SO_2$ NON-ATTAINMENT AREA

2.0 km Radium Around
Cenex Refinery (Point A)

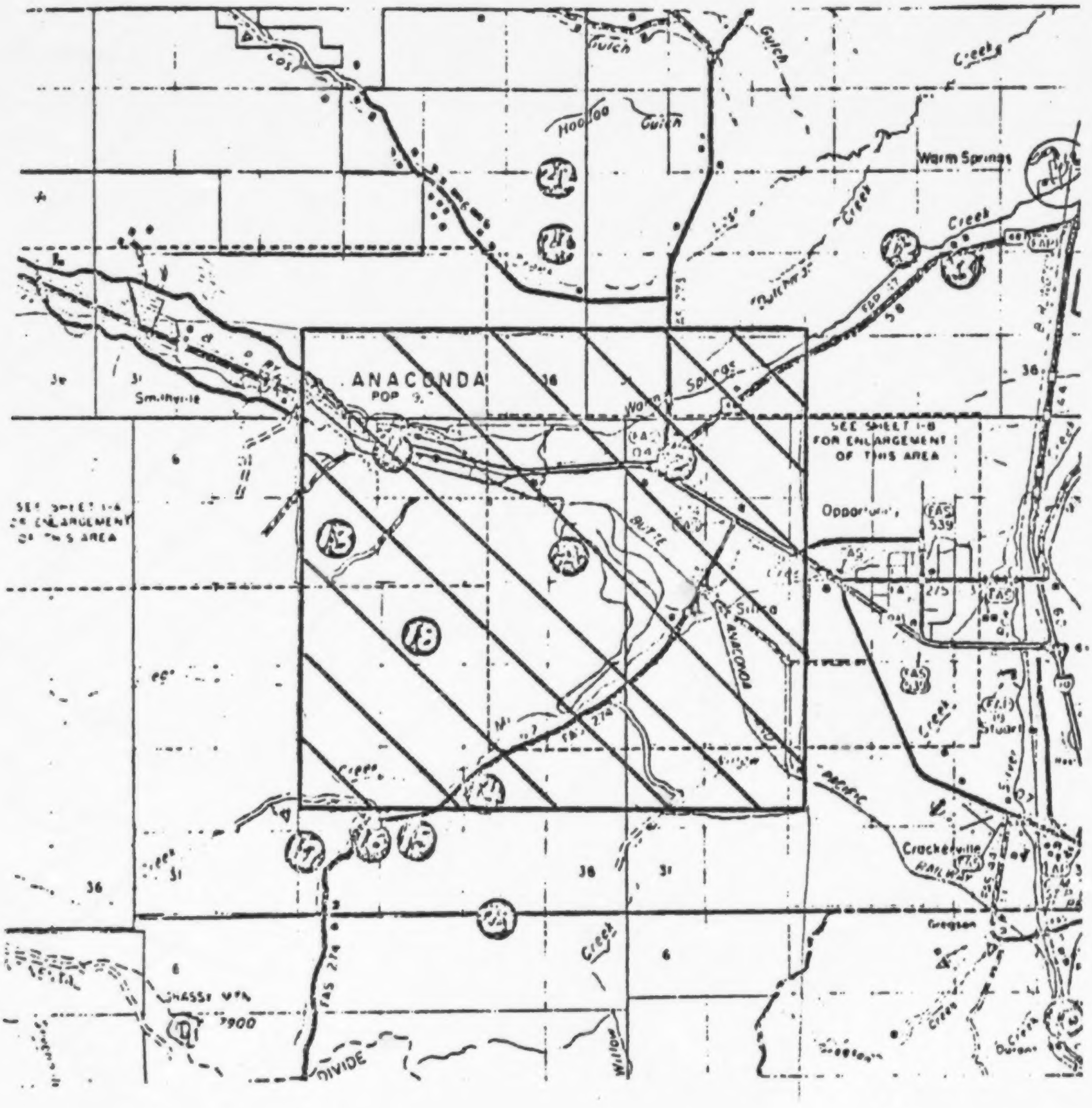
AQCR 140


6
5
BERKELEY PIT
7
8
9
McQueen
17
18
East Butte
16
Canyon
Horse
BURLINGTON
Creek
NORTHERN
20
21
Gulch
Tromway
Reese
28
29
Brooks

Butte TSP
Nonattainment Area

North Boundary T 3-4 N
East Boundary I-15/US 91
South Boundary I-90,15/US 91
West Boundary I-90,15 Business Loop, Main St., City Limits

AQCR 142


ANACONDA
POP 9.
Smithville
Warm Springs
Opportunity
Silica
Crackerville
Gregson
Hoodoo Gulch
Gulch
Creek
DIVIDE
Willow
SEE SHEET I-B FOR ENLARGEMENT OF THIS AREA
SEE SHEET I-A FOR ENLARGEMENT OF THIS AREA
PACIFIC
RAILWAY
SMOKY MTN
7900
FAS 274

ANACONDA

$SO_2$ NON-ATTAINMENT AREA

ANACONDA SMELTER - POINT A

AQCR 142

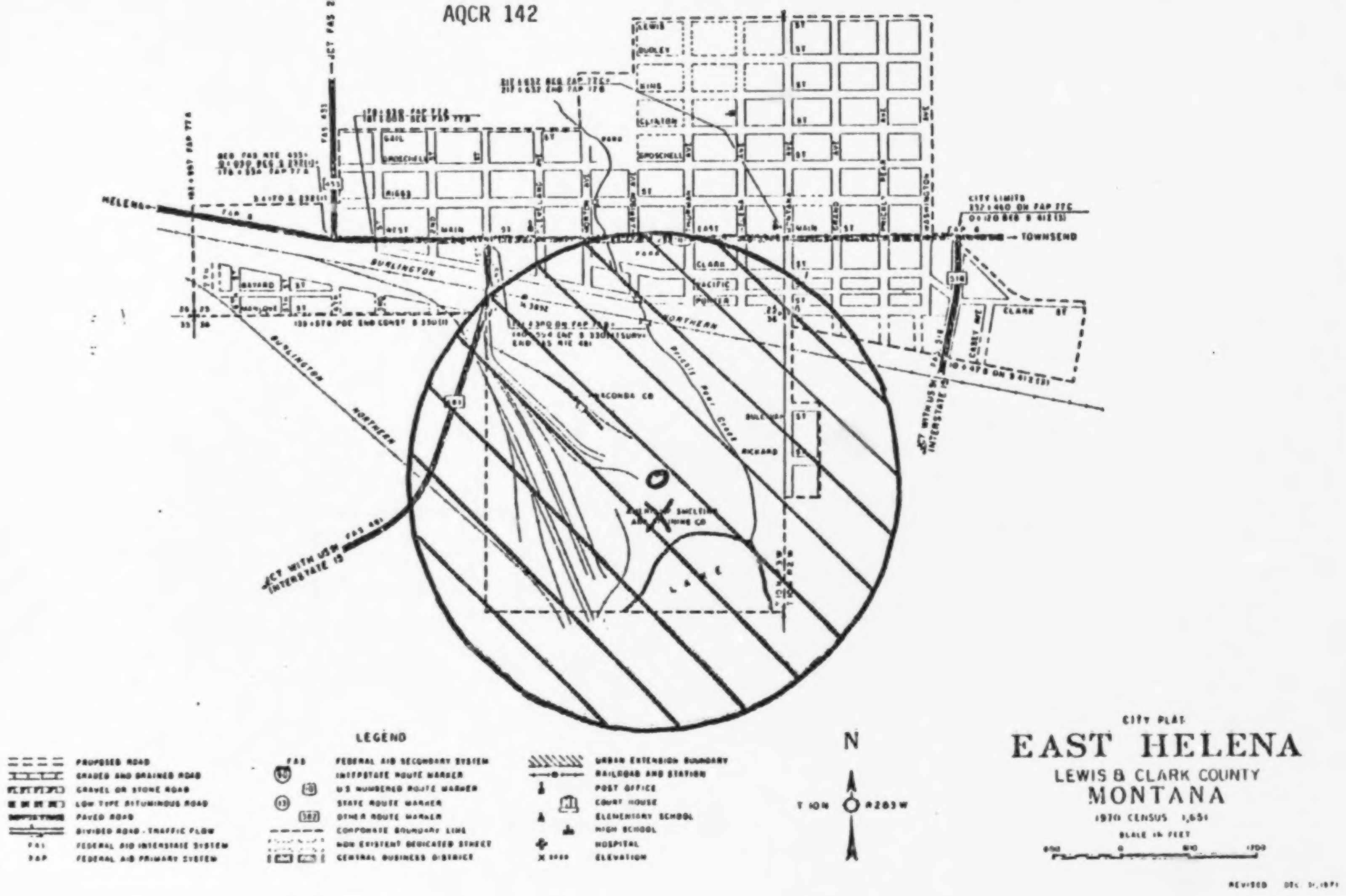
Copies of this map are available for a nominal cost at the Montana Department of Highways—Helena, Montana 59601

## EAST HELENA

## SO$_2$ NON-ATTAINMENT AREA

## 0.67 Km Radius Around Smelter

## AQCR 142

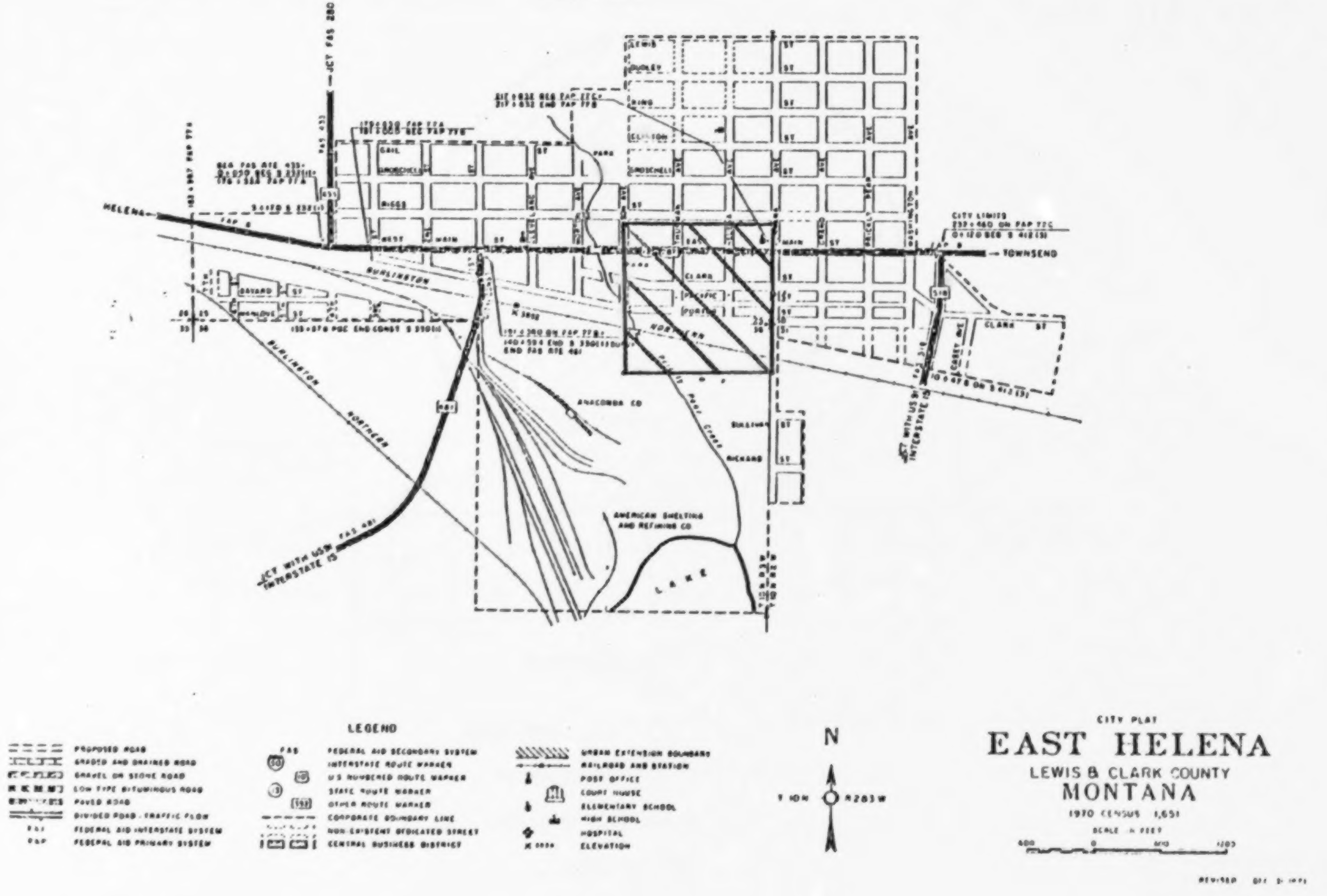

HELENA
TOWNSEND
JCT FAS 280
FAS 433
FAP 8
CITY LIMITS
WEST
MAIN
ST
EAST
MAIN
ST
GAIL
GROSCHELL
RIGGS
LEWIS
DUDLEY
KING
CLAYTON
CLARK
PACIFIC
POPLAR
WASHINGTON
BAYARD
BURLINGTON
NORTHERN
BURLINGTON
NORTHERN
ANACONDA CO
AMERICAN SMELTING AND REFINING CO
Prickly Pear Creek
RICHARD
LAKE
JCT WITH US 91 INTERSTATE 15
JCT WITH US 91 INTERSTATE 15
CLARK ST
CAREY AVE
LEGEND
PROPOSED ROAD
GRADED AND DRAINED ROAD
GRAVEL OR STONE ROAD
LOW TYPE BITUMINOUS ROAD
PAVED ROAD
DIVIDED ROAD - TRAFFIC FLOW
FAI FEDERAL AID INTERSTATE SYSTEM
FAP FEDERAL AID PRIMARY SYSTEM
FAS FEDERAL AID SECONDARY SYSTEM
INTERSTATE ROUTE MARKER
U S NUMBERED ROUTE MARKER
STATE ROUTE MARKER
OTHER ROUTE MARKER
CORPORATE BOUNDARY LINE
NON EXISTENT DEDICATED STREET
CENTRAL BUSINESS DISTRICT
URBAN EXTENSION BOUNDARY
RAILROAD AND STATION
POST OFFICE
COURT HOUSE
ELEMENTARY SCHOOL
HIGH SCHOOL
HOSPITAL
ELEVATION
N
T 10N
R 2&3 W
CITY PLAT
EAST HELENA
LEWIS & CLARK COUNTY
MONTANA
1970 CENSUS 1,651
SCALE IN FEET
850
0
850
1700
REVISED DEC. 31, 1971

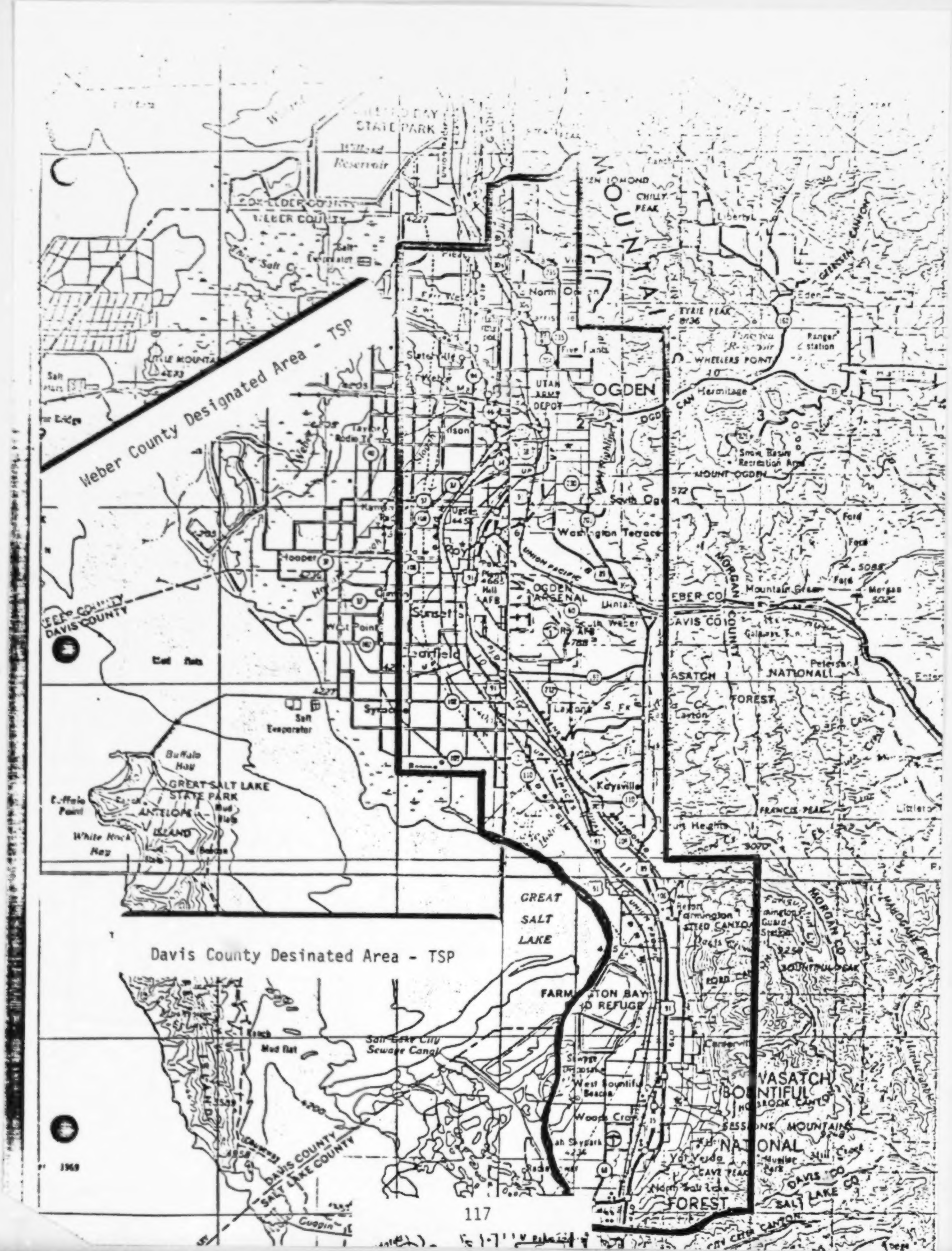
# EAST HELENA

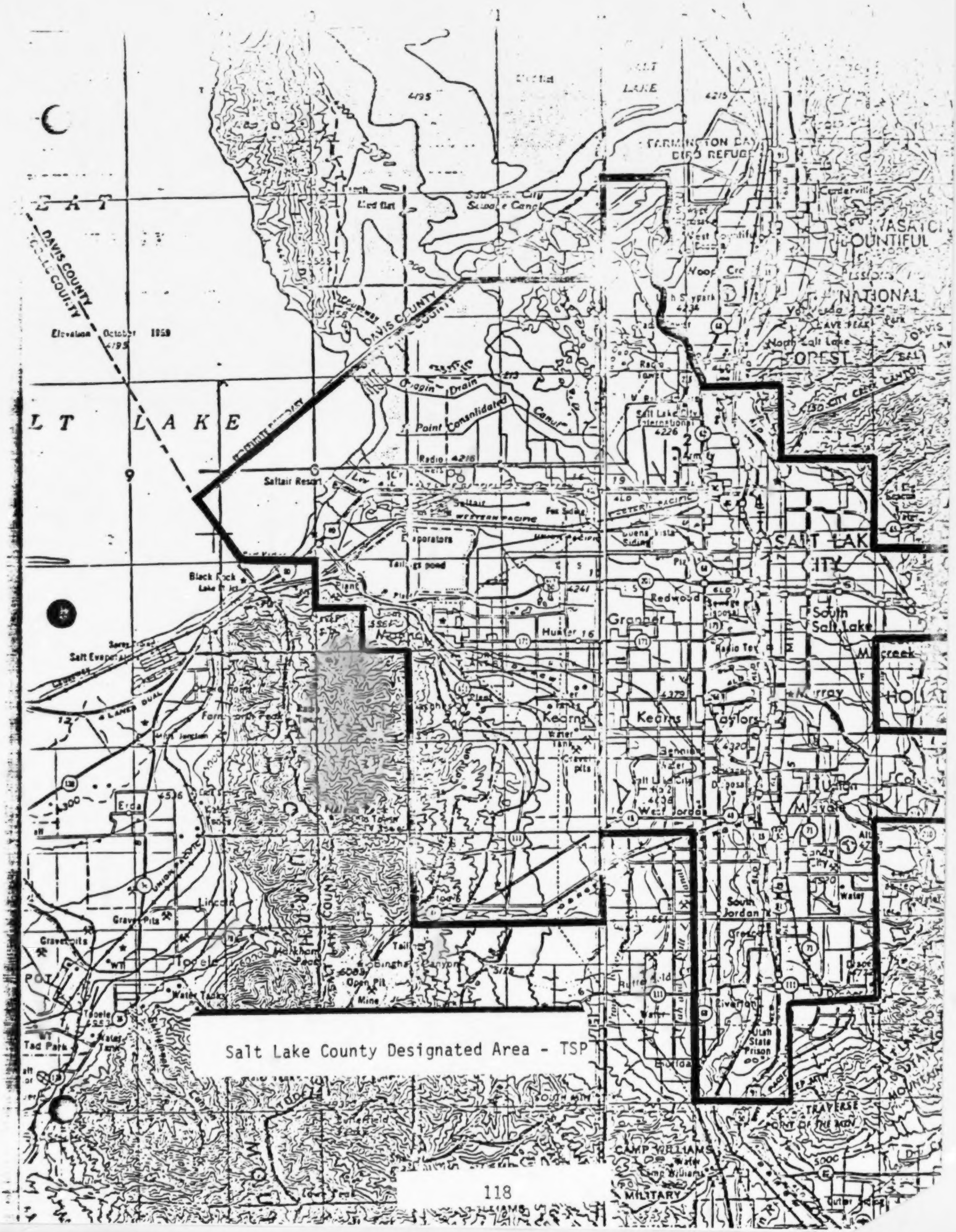
## TSP NON-ATTAINMENT AREA

## AQCR 142

Copies of this map are available for a nominal cost at the Montana Department of Highways—Helena, Montana 59601


HELENA
TOWNSEND
JCT FAS 280
JCT WITH US 91 INTERSTATE 15
CITY LIMITS
MAIN ST
BURLINGTON NORTHERN
ANACONDA CO
AMERICAN SMELTING AND REFINING CO
LAKE
PRICKLY PEAR CREEK
LEWIS
DUDLEY
RIGGS
GAIL
CLARK ST
LEGEND
PROPOSED ROAD
GRADED AND DRAINED ROAD
GRAVEL OR STONE ROAD
LOW TYPE BITUMINOUS ROAD
PAVED ROAD
DIVIDED ROAD - TRAFFIC FLOW
FAI FEDERAL AID INTERSTATE SYSTEM
FAP FEDERAL AID PRIMARY SYSTEM
FAS FEDERAL AID SECONDARY SYSTEM
INTERSTATE ROUTE MARKER
U S NUMBERED ROUTE MARKER
STATE ROUTE MARKER
OTHER ROUTE MARKER
CORPORATE BOUNDARY LINE
NON-EXISTENT DEDICATED STREET
CENTRAL BUSINESS DISTRICT
URBAN EXTENSION BOUNDARY
RAILROAD AND STATION
POST OFFICE
COURT HOUSE
ELEMENTARY SCHOOL
HIGH SCHOOL
HOSPITAL
ELEVATION
N
T 10N
R 2&3 W
CITY PLAT
EAST HELENA
LEWIS & CLARK COUNTY
MONTANA
1970 CENSUS 1,651
SCALE IN FEET
600
0
600
1200
REVISED

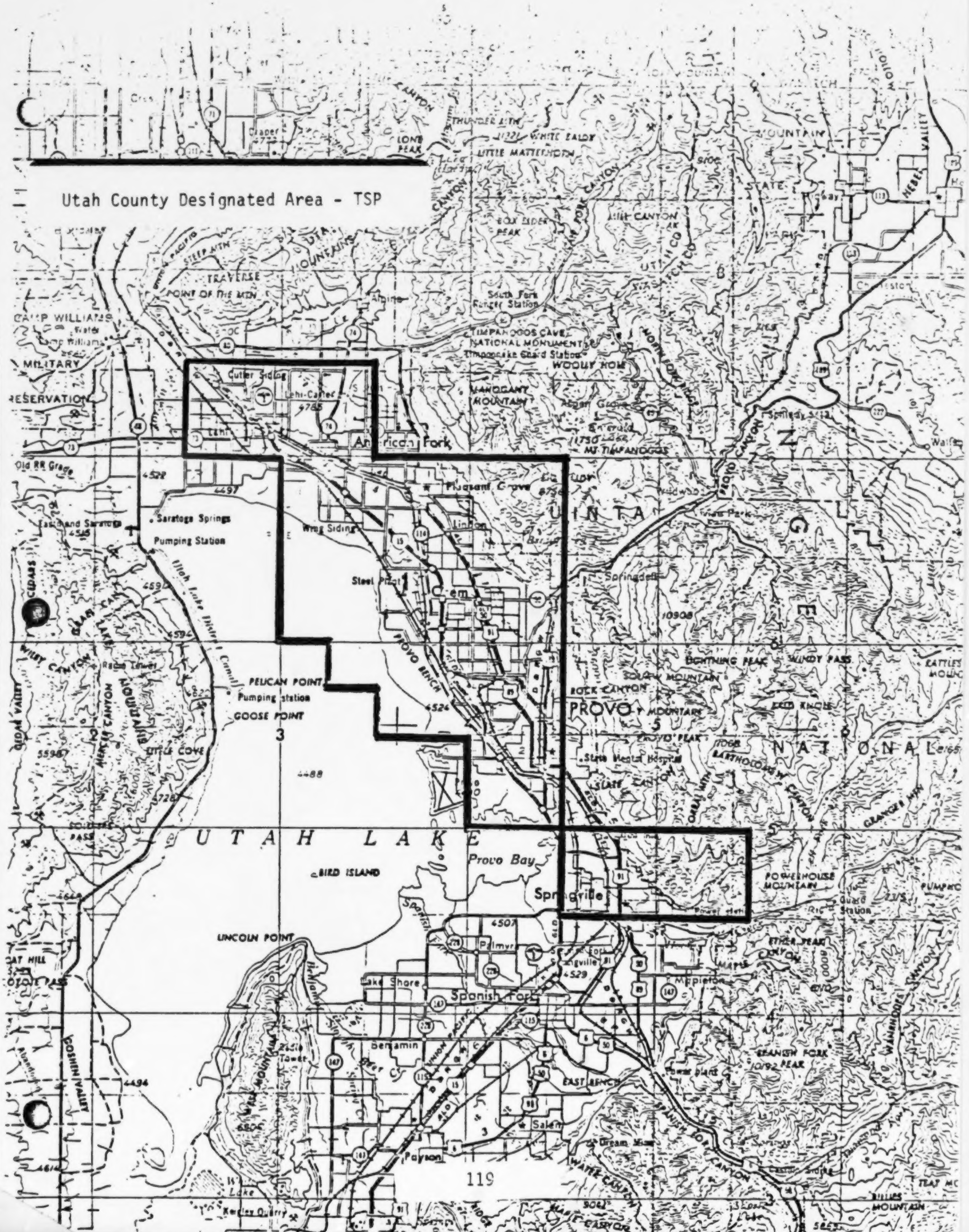

Weber County Designated Area - TSP
Davis County Desinated Area - TSP
STATE PARK
Willard Reservoir
BOX ELDER COUNTY
WEBER COUNTY
Salt Evaporator
BEN LOMOND
CHILLY PEAK
Liberty
North Ogden
EYRIE PEAK 8136
Eden
Ranger station
WHEELERS POINT
Five Points
UTAH ARMY DEPOT
OGDEN
OGDEN CAN
Hermitage
Snow Basin Recreation Area
MOUNT OGDEN
South Ogden
Washington Terrace
Roy
Hooper
UNION PACIFIC
OGDEN ARSENAL
Hill AFB
WEBER CO
DAVIS CO
MORGAN COUNTY
Mountain Green
Morgan
South Weber
Clinton
Sunset
West Point
Clearfield
WASATCH
NATIONAL
FOREST
Syracuse
Layton
Salt Evaporator
Kaysville
Buffalo Bay
GREAT SALT LAKE STATE PARK
Buffalo Point
ANTELOPE ISLAND
White Rock Bay
Mud Flats
FRANCIS PEAK
Fruit Heights
GREAT SALT LAKE
Farmington
STEED CANYON
MORGAN CO
BOUNTIFUL PEAK
FARMINGTON BAY BIRD REFUGE
Salt Lake City Sewage Canal
Mud Flat
Centerville
West Bountiful
Woods Cross
WASATCH
BOUNTIFUL
HOLBROOK CANYON
SESSIONS MOUNTAINS
NATIONAL
Val Verda
North Salt Lake
FOREST
DAVIS CO
SALT LAKE CO
DAVIS COUNTY
SALT LAKE COUNTY
CITY CREEK CANYON

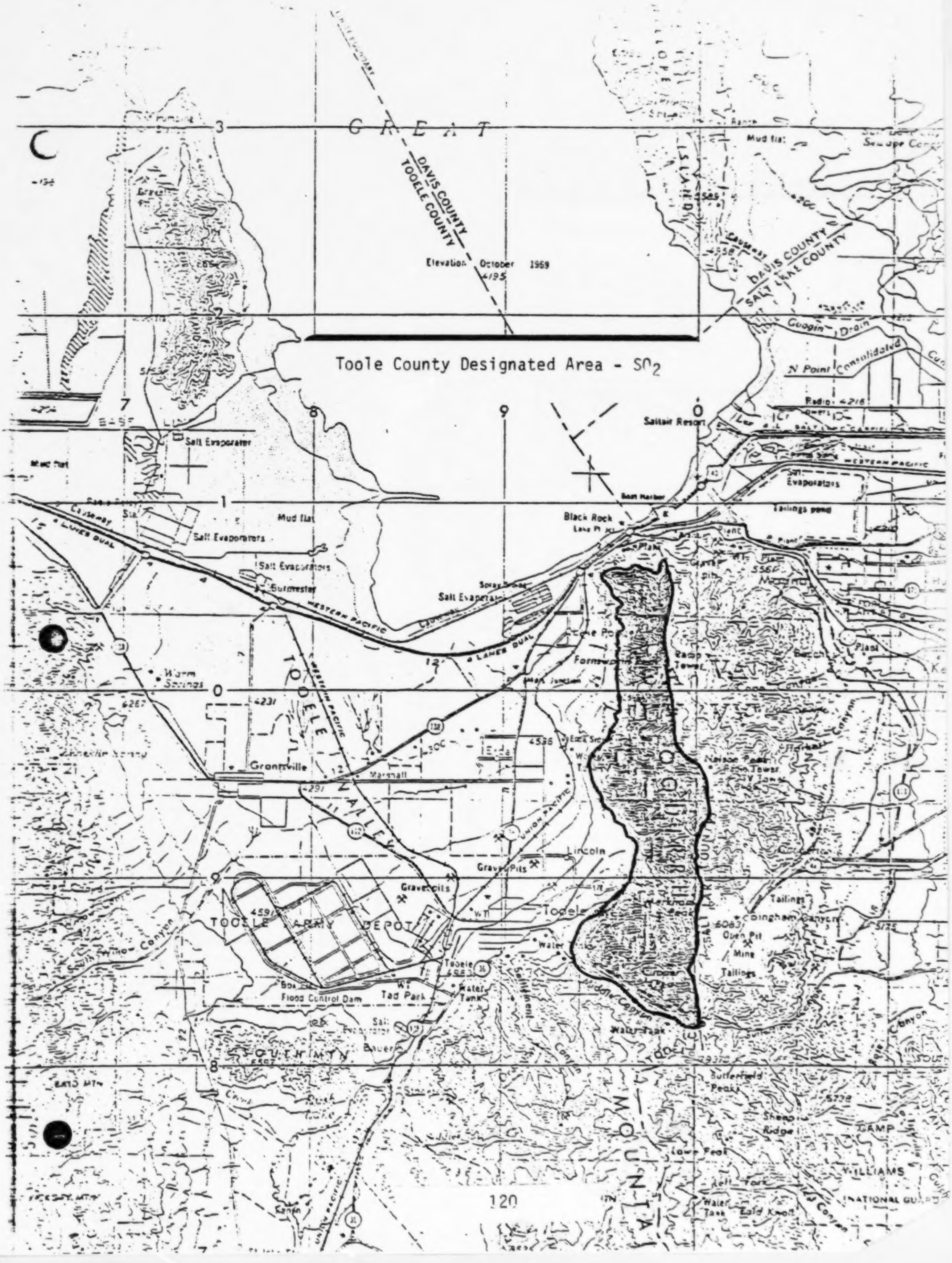


GREAT SALT LAKE
DAVIS COUNTY
SALT LAKE COUNTY
Elevation October 1959 4195
Saltair Resort
Black Rock
Salt Evaporators
Tailings pond
Magna
Hunter
Granger
Redwood
Kearns
Taylorsville
Murray
South Salt Lake
Millcreek
Holladay
SALT LAKE CITY
Salt Lake City International
North Salt Lake
Bountiful
West Bountiful
Woods Cross
Centerville
Farmington Bay Bird Refuge
WASATCH NATIONAL FOREST
West Jordan
South Jordan
Midvale
Union
Sandy City
Riverton
Bluffdale
Herriman
Utah State Prison
Camp Williams
MILITARY
Traverse Point of the Mountain
Tooele
Erda
Lincoln
Bingham Canyon
Open Pit Mine
Goose Creek Drain
Kennecott

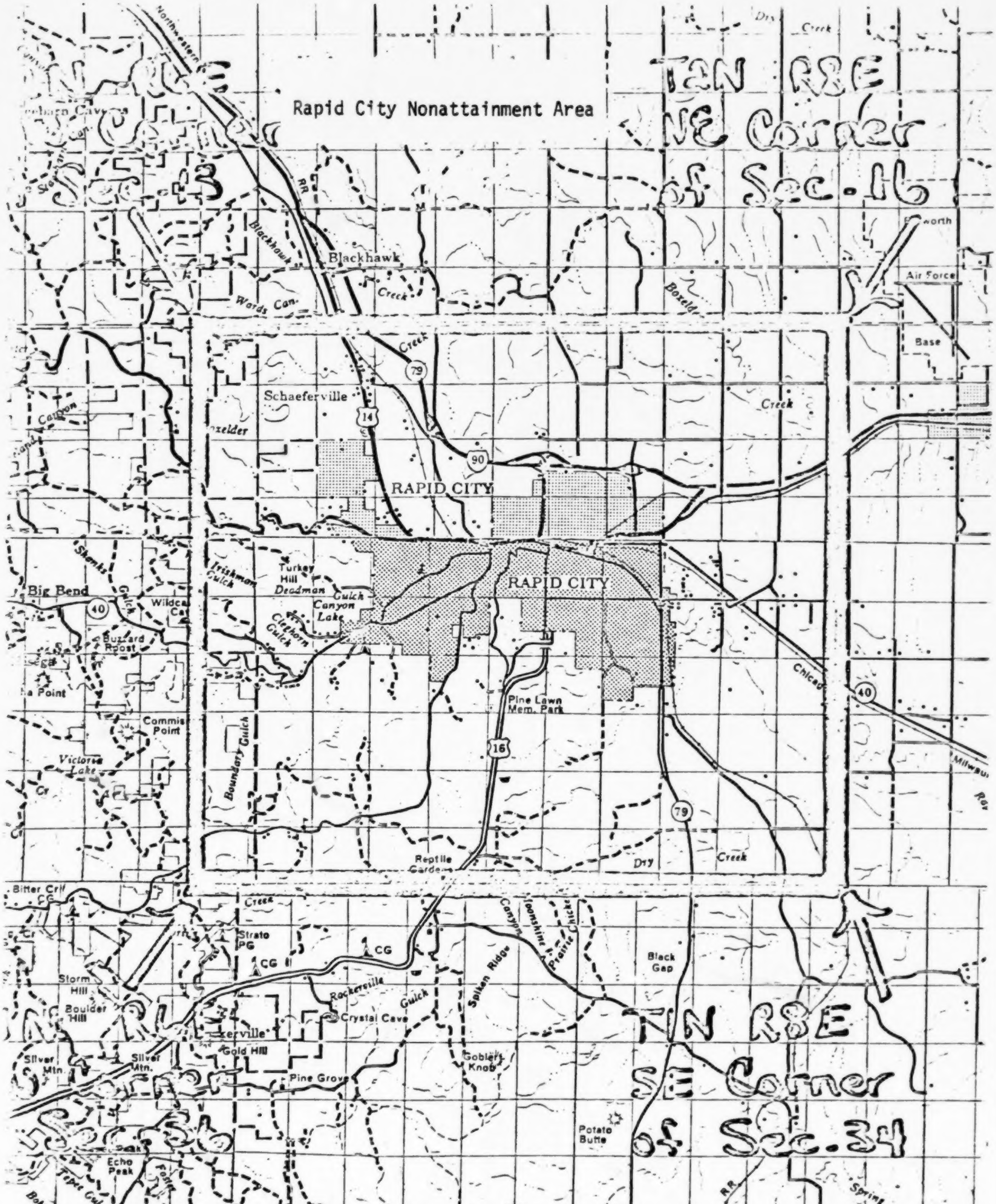
Salt Lake County Designated Area - TSP

Utah County Designated Area - TSP


CAMP WILLIAMS
MILITARY
RESERVATION
TRAVERSE
POINT OF THE MTN
Cutler Siding
Lehi
American Fork
Pleasant Grove
Lindon
Saratoga Springs
Pumping Station
Steel Plant
Orem
PROVO BENCH
PELICAN POINT
Pumping station
GOOSE POINT
UTAH LAKE
BIRD ISLAND
Provo Bay
Springville
LINCOLN POINT
Lake Shore
Spanish Fork
Palmyra
Mapleton
Benjamin
Salem
Payson
EAST BENCH
PROVO
PROVO PEAK
State Mental Hospital
SLATE CANYON
SOUTH MOUNTAIN
ROCK CANYON
TIMPANOGOS CAVE NATIONAL MONUMENT
MT TIMPANOGOS
PROVO CANYON
NORTH FORK
SPANISH FORK CANYON
SPANISH FORK PEAK
POWERHOUSE MOUNTAIN
MAPLE CANYON
UINTA NATIONAL
BOX ELDER PEAK
LITTLE MATTERHORN
LONE PEAK
Draper
Alpine
South Fork Ranger Station
Springdell
Power plant
WEST MOUNTAIN
GOSHEN VALLEY
CEDAR VALLEY
Kerley Quarry

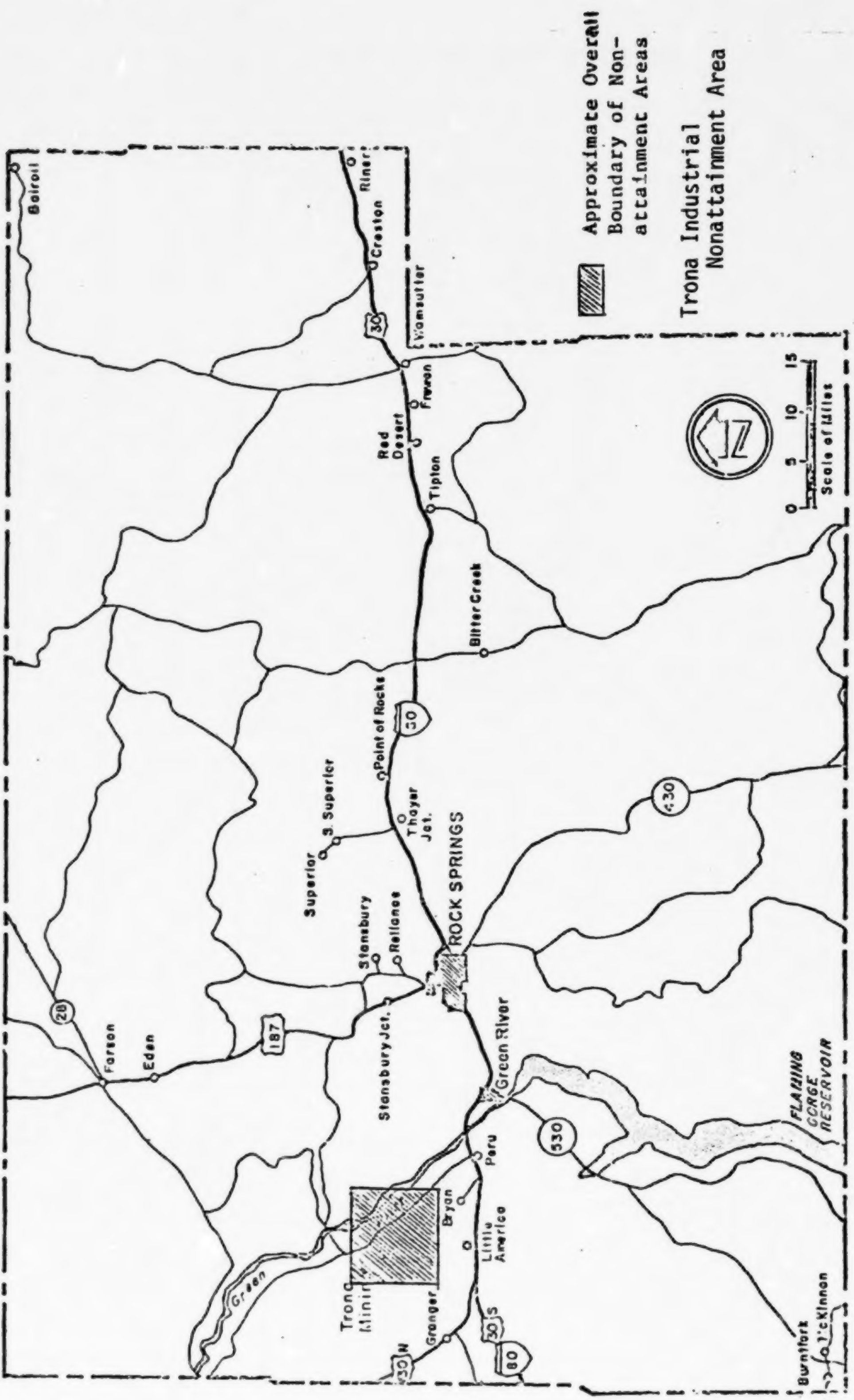

C
GREAT
DAVIS COUNTY
TOOELE COUNTY
Elevation October 1969
4195
DAVIS COUNTY
SALT LAKE COUNTY
Mud flat
Goggin Drain
N Point Consolidated
Radio
Saltair Resort
Salt Evaporator
Mud flat
Salt Evaporators
Salt Evaporators
Burmester
WESTERN PACIFIC
Salt Evaporators
Black Rock
Tailings pond
Salt Evaporators
Warm Springs
Grantsville
Marshall
TOOELE
VALLEY
Lincoln
Gravel Pits
Gravel pits
TOOELE ARMY DEPOT
Tooele
Flood Control Dam
Tad Park
Water Tank
Bauer
SOUTH MTN
Nelson Peak
Bingham Canyon
Open Pit
Mine
Tailings
Butterfield Peaks
Lowe Peak
WILLIAMS
NATIONAL GUARD
OQUIRRH
MOUNTAINS
UNION PACIFIC
3
2
7
8
9
0
1
0
9
8

Toole County Designated Area - SO2



Rapid City Nonattainment Area

T2N R8E
NE Corner of Sec. 16
T1N R8E
SE Corner of Sec. 34
Northwestern
RR
Blackhawk
Wards Can.
Creek
Dry Creek
Elsworth
Air Force
Base
Boxelder
Schaeferville
14
79
90
RAPID CITY
RAPID CITY
Big Bend
40
Wildcat
Buzzard Roost
Commis. Point
Victoria Lake
Irishman Gulch
Turkey Hill
Deadman Gulch
Canyon Lake
Cleghorn Gulch
Boundary Gulch
Pine Lawn Mem. Park
16
Chicago
Milwau
Reptile Gardens
Dry
Creek
Bitter Crk CG
Strato PG
CG
Storm Hill
Boulder Hill
Rockerville
Crystal Cave
Gulch
Spiken Ridge
Moonshine
Prairie Chicken
Black Gap
Silver Mtn.
Gold Hill
Pine Grove
Gobler Knob
Potato Butte
Echo Peak
Tepee Gul
Bobtail Gulch
Lead Draw
Murphy
Well
Smith
NW RR
Spring
Harney
Battle Cr. CG



Approximate Overall Boundary of Non-attainment Areas
Trona Industrial Nonattainment Area
ROCK SPRINGS
Green River
Bairoil
Creston
Riner
Wamsutter
Frewen
Red Desert
Tipton
Bitter Creek
Point of Rocks
Superior
S. Superior
Thayer Jct.
Stansbury
Reliance
Stansbury Jct.
Farson
Eden
Peru
Bryan
Little America
Granger
Trona Minin
Green
Burntfork
McKinnon
FLAMING GORGE RESERVOIR
30
30N
30S
80
187
28
430
530
0
5
10
15
Scale of Miles

SWEETWATER COUNTY